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The basic question to be considered was: "What will it take to provide adequate numbers of appropriately qualified operators of X-ray machines in medicine?" The conference was planned to provide maximum opportunity for exchange of ideas among technicians, educators of technicians, employers of technicians, and those involved in regulating the practice of technicians. There were approximately 340 participants. Major presentations included in the document are: (1) a keynote address by R.H. Morgan, (2) "Health Manpower" by H.I. Scudder, (3) "Radiologic Technologists--Professional Development and Regulation" by R.C. McGowan, (4) "AMA X-ray Technician" by A.N. Taylor, and (5) "New York State's X-ray Technology Program" by G.W. Larimore, John Roach, and H.T. Goldman. A sixth presentation, "X-ray Technician Manpower" by H.L. McMartin was primarily a report of findings of a Division of Radiological Health pilot study to determine the characteristics of 1,100 practicing technicians. Issues presented in work group reports included community college programs, financial support, career opportunities, licensure, teacher education, and inactive technicians. (JK)

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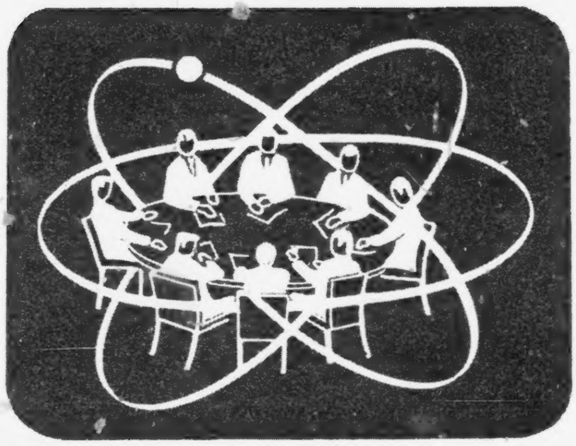
NATIONAL CONFERENCE on X·RAY TECHNICIAN TRAINING



Conference held at:
CENTER OF ADULT EDUCATION
UNIVERSITY of MARYLAND
COLLEGE PARK, MARYLAND
●
SEPTEMBER 7 ● 9, 1966

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
●
Training Branch
Division of Radiological Health
Rockville, Maryland

CENTER
ADULT
EDUCATION

NATIONAL CONFERENCE on X•RAY TECHNICIAN TRAINING

PREFACE

This report presents the official proceedings of the National Conference on X-ray Technician Training held September 7-9, 1966 at the University of Maryland Center for Adult Education. The Conference was called as a result of a recommendation to the Surgeon General by the National Advisory Committee on Radiation that the Public Health Service study the national X-ray technician manpower problem. In developing the plan for the Conference, every effort was made to provide maximum opportunity for exchange of ideas with not only the technicians themselves, but those who employ them, those who educate them, and those engaged in their regulation. The list of participants attests to the success attained in obtaining widespread national representation from all of the interested groups as well as the professional associations and governmental agencies concerned.

The basic question the Conference considered was, "What will it take to provide adequate numbers of appropriately qualified operators of X-ray machines in medicine?" This report of the Conference's General Sessions contains the formal presentations that set the stage for discussions by all participants during work-group sessions as well as the concluding statements and discussion. While the work groups were not recorded verbatim, their summary reports were presented in a general session and are included in this publication. We believe these proceedings will be a valuable reference and guide for future action.

As Conference Chairman, I wish to thank the guest speakers, moderators, assistant moderators, recorders, and all participants for their contributions toward making this Conference a success. In particular, may I express my appreciation to the Conference Consultant, A. Bradley Soule, M.D., for his personal counsel in the organization and development of the Conference.

Donald R Chadwick

Donald R. Chadwick, M.D.
Chief, Division of Radiological Health

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NATIONAL CONFERENCE ON X-RAY TECHNICIAN TRAINING

September 7-9, 1966
Center of Adult Education
University of Maryland
College Park, Maryland

PROGRAM AGENDA

Sponsored by: U.S. Department of Health, Education and Welfare
Public Health Service
Division of Radiological Health

Conference Consultant: A. Bradley Soule, M.D.

Wednesday, September 7		
5:00 p.m.	**Registration** (Resource materials provided at this time to registrants)	Lobby, Center of Adult Education
6:30 p.m.	Dinner	Ft. McHenry Room
8:00 p.m.	**Conference Get-Acquainted Reception** PHS Mobile Radiological Health Training Laboratory Exhibits and Training Aids on Display Host: USPHS, Division of Radiological Health, Training Branch	Ft. McHenry Room
Thursday, September 8		
7:00 - 8:30 a.m.	Breakfast	Coffee Shop
8:30 - 12:00	FIRST GENERAL SESSION	Ft. McHenry Room
	Welcome and Opening Remarks Richard A. Prindle, M.D. Chief, Bureau of State Services USPHS	
	Keynote Address Russell H. Morgan, M.D. Professor of Radiological Science Johns Hopkins Hospital, Maryland	
	Health Manpower Harvey I. Scudder, Ph.D. Manpower Resources Consultant Division of Community Health Services USPHS	

Thursday, September 8 (Cont.)

	X-ray Technician Manpower Howard L. McMartin, M.D. Chief, State Assistance Branch Division of Radiological Health Bureau of State Services, USPHS	
10:00 a.m.	Coffee Break	Exhibit Hall
	Radiologic Technologists--Professional Development and Regulation Roland C. McGowan, R.T. Executive Director, The American Registry of Radiologic Technologists and Leslie Wilson, R.T. President, The American Society of Radiologic Technologists	
	A.M.A. X-ray Technician Training A. N. Taylor, Ph.D. Associate Secretary Council on Medical Education American Medical Association	
	New York State's X-ray Technology Program Granville W. Larimore, M.D., M.P.H. First Deputy Commissioner New York State Department of Health Howard L. Goldman, L.X.T. Director, X-ray Technology New York State Department of Health John Roach, M.D. Radiologist, Department of Radiology Albany Medical Center Hospital New York	
	Conference Challenge Donald R. Chadwick, M.D., Chief Division of Radiological Health Bureau of State Services, USPHS	
12:00	Luncheon	Rathskellar

Thursday, September 8 (Cont.)

1:00 - 5:00 p.m. FIRST WORK GROUP SESSION: A, B, C, Exhibit Hall

Discussion Topic: Develop expert opinion on "What will it take to provide adequate numbers of appropriately qualified operators of X-ray equipment in medicine?"

3:00 p.m. Coffee Break Exhibit Hall

WORK GROUPS	MODERATORS
I - Room A	Reynold F. Brown, M.D. Department of Radiology University of California Hospital
II - Room B	Richard Olden, R.T. Department of Radiology Johns Hopkins University Maryland
III - Room C	John Heslep, Ph.D. Chief, Radiological Health California State Dept. of Public Health
IV - Exhibit Hall	Sister Mary Alacoque Anger, R.T. Director, School of Radiologic Technology St. Mary's Hospital Clayton, Missouri

6:30 p.m. Dinner Ft. McHenry Room

8:00 - 10:00 p.m. ROUND TABLE SESSION Ft. McHenry Room

Moderator:
Saul J. Harris
Program Director, Radiological Health, PHS Region II
New York

Topic: Off-the-record discussion on present and planned X-ray technician training. Any participant may present and discuss education and training ideas and problems.

Friday, September 9

7:00 - 8:00 a.m.	Breakfast	Coffee Shop
8:00 - 10:00	SECOND WORK GROUP SESSION	A, B, C, Exhibit Hall
	Coffee Break	Exhibit Hall
10:30 - 12:30 p.m.	SECOND GENERAL SESSION	Ft. McHenry Room
	Discussion of Work Group Reports by Group Moderators	
12:30 - 1:30 p.m.	Lunch	Rathskellar
1:30 - 3:00	THIRD GENERAL SESSION	Ft. McHenry Room
	Conference Summary	

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Chairman, Committee on Technologist Training
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Administrative Coordinator
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University of Maryland

First General Session

INTRODUCTION

DR. DONALD R. CHADWICK, Conference Chairman: I am Don Chadwick from the Division of Radiological Health of the Public Health Service.

I want to welcome you to the session this morning and indicate how gratified I am to see so many of you wide-awake and bushy-tailed. We have a rather full schedule this morning, and so I would like to move along.

We were somewhat concerned about the short notice that we gave you for this session, but it was a matter of fitting in our schedule with the schedule of the Center here at the University of Maryland. And a somewhat short time between the invitations and the session resulted.

To give us some opening remarks and an official welcome from the Public Health Service, we have with us this morning, Dr. Richard Prindle, Assistant Surgeon General, who is Chief of the present Bureau of State Services.

As many of you know, the Public Health Service is in the process of reorganizing in line with a reorganization plan submitted by the President to the Congress. Dr. Prindle will be in charge of the new Bureau of Disease Prevention and Environmental Control.

Dr. Prindle will give us an official welcome from the Public Health Service. Dick.

WELCOME AND OPENING REMARKS

DR. RICHARD A. PRINDLE: Thank you, Don. It is my pleasure to welcome you to the National Conference on X-ray Technician Training on behalf of the Public Health Service, and to second Don's comments on our gratitude for the large turnout, especially on this short notice, and on the obvious interest that a group of this type must have to have come in such numbers on this occasion.

This conference really is a partial result of the NACOR report which was prepared under the able direction of the chairman, Dr. Russell Morgan. You have a copy of the report in your folder. It outlines some of the problems facing us in our new look in the field of radiation and especially accents the problems related to training and to manpower shortages generally.

I call your attention to that second recommendation which is the very broad one covering the problems of training and manpower. It is in partial response to that recommendation that this meeting is being held.

The problems of manpower generally, of course, are well known to most of you. I think we in the Public Health Service especially have been concerned the last few years with the growing shortages, not only in this field, but in all health fields, and with the problems that these groups face in trying to build and provide the proper organization and manpower balances for the future.

Certainly, I can't help but reiterate the words of the Surgeon General sometime ago when we were discussing this very field of radiation manpower and the shortage of radiologists. He said he was told by his friends in the psychiatric field that they needed many more psychiatrists. The American Academy of Pediatrics had just been in to explain they needed three times as many pediatricians. Another group wanted 25 percent of the medical graduates for pathologists. So by the time the boys had completed their fourth year of medical school, 400 percent of them already had been required for something.

This is the problem that is facing the country generally and one of special concern to us with the new problems of medical care that are facing the nation.

I think your field is one which has especially acute shortages, but perhaps it also has the chance for some leadership in this area. And I think this conference is a stepping stone toward achieving leadership in utilization of other supporting professions and supporting technical groups who can in a sense extend the reach of the arm of the radiologist and the physician in their normal practice.

I think your group, in facing the problems of effective utilization of manpower and the better organization of medical care techniques in your field, can provide leadership in dealing with this important problem which will be facing the other parts of the medical profession just as well.

Dr. Chadwick mentioned the reorganization of the Public Health Service. And I will not belabor the details of that organization except to point out that in the new organization there will be five bureaus, one of which will be the bureau he mentioned--Disease Prevention and Environmental Control. That Bureau will have the Radiological Health Program and will hope to develop it as a national focal point for radiological health.

There will also be a Bureau of Health Manpower, expressing in a sense the concern of the Surgeon General and the Secretary over the whole manpower problem. We look to a fruitful and very useful relationship with our sister bureau in working on such problems as those facing groups like this.

All I want to add, again, is my welcome and urge you to help us reach conclusions that will lead to the proper development of manpower in this field; to recommend to us, as the Public Health Service, what role we should play in trying to develop this approach.

Thank you very much.

DR. CHADWICK: Thank you Dick. Dr. Prindle has already mentioned the next person on the program--Dr. Russell Morgan.

I guess the cliché "he needs no introduction" is quite appropriate in the case of Dr. Morgan, but let me at least mention that Russ has been the Surgeon General's principal advisor in radiation since 1957 and in that capacity has served as chairman of the National Advisory Committee on Radiation, NACOR, with which I am sure all of you are familiar.

As Dr. Prindle has indicated, it was NACOR's recommendations in its most recent report, a copy of which you have in your packet of materials, in connection with the needs for manpower in the radiological sciences that were very largely instrumental in bringing this conference here today.

So it is quite fitting for Dr. Morgan to give us some additional thoughts based on the NACOR report that will guide us in our discussions as we look at this problem in providing adequate numbers of well-qualified X-ray technicians.

Russ.

KEYNOTE ADDRESS

DR. RUSSELL H. MORGAN: Thank you, Don. When the members of NACOR prepared their recent report, they faced many questions about manpower needs in radiologic technology. To many of these questions, answers weren't readily available. Hence, it seemed appropriate to come to the technologists themselves to get these answers. Accordingly, this meeting today and tomorrow was arranged.

Now, I am not sure what the function of the keynote speaker is except perhaps to ask questions. Hence my remarks this morning will be largely questions to which I hope you will direct your attention during the next day or two.

As you all well know, the profession of radiology has a record of growth unparalleled in the science of medicine. In a little over 70 years since Roentgen's discovery of the X-ray in 1895, radiology has grown until today over 90 million people are studied each year by diagnostic X-ray methods in the United States--over half the population.

Radiologic procedures also have become extensively used, of course, in the treatment of neoplastic disease. And recently, the growth of radiology has been further accelerated by the emergence of the discipline of nuclear medicine.

Taken together, the radiological sciences have had a profound influence on the practice of American medicine.

In its recent report to the Surgeon General, NACOR studied the development of clinical radiology since the time of Roentgen's discovery. It showed that decade after decade, the clinical demand for diagnostic X-ray services has increased at a compounded annual rate in excess of 7 percent.

It might be expected that this phenomenal rate of growth would ultimately level off. However, there is no sign of this. Indeed, with the development of nuclear medicine, the rate with which radiological methods are being applied in medicine is increasing rather than decreasing.

Now, such rapid growth has not occurred by accident. Radiological methods have proven of enormous value in the detection and delineation of disease over a wide range. A recent unpublished study in our institution has shown that over the past decade, the nature of the clinical problems of almost half of all the patients entering our hospital was either discovered or confirmed radiologically.

Furthermore, these methods were employed in many additional patients to exclude the presence of disease when clinical uncertainty prevailed.

The sustained and unrelenting growth of clinical radiology has not been without its problems. Perhaps chief among these has been the difficulty of finding adequate numbers of trained personnel to provide the radiological services needed.

Growth rates of the type discussed here indicate a doubling in clinical demand at least every nine to ten years.

The number of physicians entering radiologic practice has not been able to keep pace.

Serious shortages of manpower, therefore, are now commonplace.

Although the National Advisory Committee on Radiation directed its principal attention to physician manpower problems in the radiological sciences, it had reason to believe that serious manpower shortages were also arising among radiologic technologists as well. It, therefore, recommended to the Surgeon General that the Service make an exhaustive study of technological manpower in the United States and take appropriate steps to correct the problems defined by the study.

Manpower problems are seldom purely quantitative in nature. Shortages almost always create disturbances of a qualitative nature--that is, disturbances of the social, scientific and economic aspects of a discipline which also have, as I say, far-reaching qualitative implications.

For example, at the present time, the number of physicians entering the specialty of radiology has increased until almost six percent of all of the graduates of American medical schools enter the specialty. It is not hard to calculate that in a discipline which is doubling in size every decade, it will not be long until a saturation point has been reached in terms of the number of new radiologists who can be trained each year.

And yet, as we have seen, the number of newly trained men even now is inadequate. There can be little question, therefore, that physician manpower in radiology will be in increasingly short demand in the years ahead although it is, of course, possible the future growth rates in the clinical demand for radiological services will level off.

However, the inexorable climb in this demand over the past several decades, I think, makes this rather unlikely.

The paucity of physician manpower in radiology is likely to have a profound effect on the field of radiological technology. Greater and greater responsibility is likely to be transferred to the technologist.

It is important that this conference recognize this trend and address itself to all of the problems which this transfer of responsibility implies. Are our technologists equipped to assume this expanding role? What effects will this trend have on the content of our training programs?

One of the increasingly urgent questions for which an answer is required is the extent of the manpower need in the field of radiologic technology. How many technologists will be required over the next decade? What kinds should be trained? And what can be done to correct a problem created when technologists leave their profession soon after the completion of their training and are lost as useful contributors to their field--a sort of dropout problem?

I should like to take a few minutes to raise a number of questions concerning the kinds of X-ray technologists required in American medicine today.

Early in this century, medical practice as a whole was relatively simple and the types of technologists--including radiologic technologists--required were rather small in number. During the past 50 years, medicine has been in a revolutionary phase of development brought about in part by the exciting new discoveries which have attended the enormous research effort that has taken place in this country, principally since World War II.

Advances in medical science have opened up vast new horizons, permitting the application of diagnostic and therapeutic measures in medical practice which until recently were undreamed of. With these advances have come complex techniques which place great technological demands upon the physician and his assistants.

The field of radiology has shared in these developments. There is a need for technologists trained well beyond the level considered adequate a few years ago--technologists with training and experience in physiology, anatomy, electronics and engineering as well as in the radiological sciences.

With the rapid growth in clinical radiology and the decreasing amount of time available to radiologists, there has developed also a need for the administrative or management technologist, an individual who by virtue of his background is given increasing responsibility for the administration of departments of radiology.

Another type of technological development concerns this complex nature to which radiology has grown.

The relationship between the technologist and the radiologist has been at times close and at other times rather distant. In the early days--that is, prior to 1930--the radiologist and technologist worked closely together. As the years wore on and the specialty became more complicated, the technologist and radiologist have tended to drift apart in some cases. In the days ahead, I suspect that this trend will reverse itself again.

With the increasing shortages of physician manpower, it may be expected that much responsibility in the practice of clinical radiology must be transferred to the technologist. In many cases, this responsibility may include quasi-professional functions.

In brief, then, it may be anticipated that the technologist will become increasingly a physician assistant with responsibilities that offer exciting opportunities not known heretofore.

The last decade has witnessed a substantial change in the educational programs needed for technologists. Standards of excellence have been established for students and schools. And this has identified a need for instructors well disciplined in the radiological sciences.

In the years ahead, we may expect an increasing demand for these educators. Because of this background and training, many and perhaps most will come from the technologist ranks.

It is evident that with all the changes which have taken place in American medicine, the role of the technologist has been undergoing substantial change. Not only is there a need for the graduate with conventional basic training, but also for technologists with advanced scientific and engineering skills, technologists with administrative capability, technologists with sufficient background and training to permit them to assume quasi-professional status as physician assistants, and technologists who have had training and experience which qualify them as technological educators.

It is not possible to discuss the subject of technological manpower without raising questions concerning the short length of time technologists work actively in their field after the completion of their training. We have made a recent study of this among our own trainees and find that each spends an average of two years in radiologic technology after graduation from the two-year program.

With the serious manpower shortages we face, it seems rather clear that we cannot afford the luxury of such limited productivity. What are the reasons behind this problem?

One of these, of course, is the fact that the great majority of technologists are women--in our case, about 80 percent of trainees--who during their early 20's frequently get married and leave technology to raise families.

Another reason is the relatively low salary scale of technologists. Although radiologic technology possesses many characteristics attractive to men, the number of male trainees and graduates is relatively small due to the limited financial opportunities available in the field.

One should not expect incomes in this field to approach those prevailing in a full professional discipline, but it does not seem too much to expect that radiologic technologists be provided incomes comparable to those of other skilled individuals. Certainly they should exceed the incomes of such semiskilled individuals and workers as plumbers, bricklayers, carpenters, and the like, a situation which does not exist today, incidentally.

This raises the question "What can be done to improve the financial status of the technologist?" It seems to me an important question for this conference to consider because it seems unlikely that the technologist manpower problem can be solved without technologist incomes becoming more realistic.

I expect that this problem is closely related to similar problems faced by nurses and medical technologists in other disciplines. All of these individuals have long suffered under a social pattern which quite unfairly has expected them to work for incomes less than that justified by their training and experience. This is tantamount to society's expecting these individuals to donate gratis a substantial fraction of their time and effort to public service.

Until this situation is corrected, I am afraid that we will be faced with the dropout problem. The loss of technical manpower is something that we cannot afford.

I should like to take a few minutes now to direct your attention to a number of developing problems in the field of training.

What should the length of training be?

What should the curriculum contain?

Should the same curriculum be used for technologists in Roentgen diagnosis, in radiation therapy, and in nuclear medicine or should there be a basic program with special training in each of these disciplines according to the technologist's wishes?

Is a two-year so-called diploma school of technology adequate?

Should baccalaureate programs be instituted for those individuals who wish to become technologists with advanced skills and knowledge, for physician assistants, for technological educators and administrators?

What is the role of the hospital in technological training? Should it continue to provide all phases of technological education or should it turn over some aspects of this educational process to universities and junior colleges while retaining its functions in the field of practical training--that is, in providing a sort of internship following formal basic training in an educational institution?

These are serious questions to which you should address yourselves at this meeting.

The matter of training raises a question concerning the educational standards which should be met by those engaged in technological education.

At one time, of course, formal standards for technologists didn't exist. With the passage of the years and the creation of an increasing number of schools of technology, the Council on Education of the American Medical Association in cooperation with the American College of Radiology and the American Society of Radiologic Technologists has instituted educational standards governing the quality of radiologic training given in the United States.

Although these standards have been carefully and diligently established, I have the uneasy feeling that in practice they are frequently not being honored. Schools of technology may be accredited even though they may be deficient in one or more requirements. It might be well for this conference to address itself to the whole problem of educational standards in radiologic technology and the methods of accreditation.

Any discussion of training requires that we address ourselves to the financial problems which arise when training is undertaken. These problems include the provision of adequate facilities, the support of faculty and the availability of stipends for students.

In the past, schools of technology have been largely supported by tuition income and from hospital revenues. I believe you should examine the question as to whether this form of financing is adequate to meet the expanding educational demands. These demands are both quantitative and qualitative and need your careful attention.

Should training grants be provided by the government for the support of faculty and the construction of needed facilities in schools of technology?

What should be the extent of the support for trainees?

Should such support include subsistence stipends as well as tuition fees?

Finally, I hope that some of you will take under consideration the question of how to provide technological services in clinical radiology most effectively. Although the standards in medical practice in the United States and the quality of medical care have never been higher, there is little question that this care might be provided more effectively and efficiently and that much wasted effort might be eliminated if care were given.

Also, as I have indicated earlier, it seems quite possible that many quasi-professional functions now performed only by radiologists might be assumed by technologists with advanced training. I should, therefore, like to ask you to examine what these quasi-professional activities might be, and the additional training needed to permit radiologic technologists to perform them effectively.

In these few minutes, I have placed before you a large number of questions which I hope you will consider. It will, of course, be quite impossible to find answers to all of these in a space of time as short at this meeting. Nevertheless, I hope that after this meeting is over, you will continue to expend your efforts on a solution to them.

American medicine in the years ahead will demand that radiologic technologists play an ever-expanding and increasingly effective role in the provision of quality health care for the public. The meeting of these demands requires careful planning by you, the leaders, in the field of radiologic technology, now.

Thank you very much.

DR. CHADWICK: Thank you very much, Russ. As I look through the program, I notice that my own name is listed under the title "Conference Challenge," but it seems to me that the conference challenge has just been given, and I am going to have a very easy job of it when we get down to the end.

I think that several of the points Dr. Morgan raised are ones that we should deal with very, very seriously in the discussion groups you will be participating in this afternoon.

You note that we have made no provision this morning for questions and answers. It seems that we have a rather full schedule just trying to list the major points. And also, we have a very large group here. It would be somewhat difficult to have questions. The discussion period will take place as we break up into groups, as you notice on your program. So there will be ample opportunity to sift these questions that Dr. Morgan has raised.

Dr. Prindle mentioned the Service's broad concern with the problem of health manpower and indicated that, indeed, this is reflected in the reorganizational program in which there will be a Bureau of Health Manpower.

With us this morning is Dr. Harvey Scudder, who is Manpower Resources Consultant, presently in the Division of Community Health Services of the Bureau of State Services. Dr. Scudder will discuss some of the general aspects of the health manpower problem as viewed from his vantage point.

Dr. Scudder.

HEALTH MANPOWER

DR. HARVEY I. SCUDDER: Thank you, Dr. Chadwick. This morning I shall attempt to discuss some of the major highlights of manpower problems as we have seen them during a year of hard work trying to analyze these from the Public Health Service's standpoint.

I want to describe in a few words the nature of the industry and point out some of the rather unusual difficulties in health manpower.

We have an industry that has been termed the third largest in this country yet has not been generally visible as such, because of its extreme dispersion, not only in terms of its management, but also in terms of the 150-200 different kinds of occupations comprising it. About two-thirds of these people work in hospital settings. The last figures for total manpower in the delivery of medical care and health services is about 3.2 million. This is rapidly moving up. The total expenditure by the public is somewhere under $40 billion at the present time, a very impressive figure. And it is rapidly increasing: it could reach $50 billion. Our concern with such an escalation is the growing need for more people of all kinds, in all of the 30 some major types that are strictly health or the 150 or more that make up the total enterprise.

The level of activity in the medical care field can be illustrated by such figures as 125 million outpatient visits in 1964; 1.7 million hospital beds and close to half of these for mental patients.

In looking at these figures and the very real prospect of their escalation, we are a bit terrified to find that less than one physician out of 15 is interested in going into general practice. The young physician looks at the broad field of medicine with its enormous change and great complexity, and says to himself, "I can't face the fact of becoming responsible for its totality. Let me find a discipline where I can feel a bit at ease and feel that perhaps I know something about it."

Specialization is not, as the layman generally would think, a way of adding two Cadillacs where there was one before, but a matter of finding a reasonable area for which one can be responsible, for which one's training gives one a sense of security.

To exaggerate all of these features, we have an enormous problem resulting from the great increase in public demand. The public demand now is beginning to parallel something that we have already seen in other fields of public health--namely, the requirement for a single high standard for medical care and health services. This is not too different from saying there needs to be a single high standard for the quality of water: that if you go to the tap for a glass of water it will be of good, potable quality regardless of whether you have an income of less than $3,000 a year or over $30,000; that if you buy a carton of milk it will have a certain high standard of purity and quality. Health has become a commodity, and it almost appears to parallel a demand which the public has insisted upon with regard to food, water, highways, and perhaps now of schools. If we can achieve it for health it would be in line with the demand of the public in all of these areas. Economically, we think the country can afford it, and we think, further, that we are a country that cannot afford sick people. Everything seems to point to this.

The number of pieces of Congressional legislation has given evidence of the public demand: in the 85th Congress, there were five pieces of legislation; in the first half of the 89th, 21 pieces. Some of these have been very large chunks, larger, perhaps, than the Congress has realized. While much has been made of Medicare (Title 18), the really big iceberg apparently is Title 19 which combines all public assistance into one huge enterprise. The highest demand is led by New York State, Pennsylvania and some others, which could mean that costs of this Program may be four times what was anticipated at the time Congress passed the bill.

If these are any indications of the future, and also if bills that are in process do pass, we have what may be properly called a crisis in health manpower. On the basis of these considerations it is quite important for us to take a look at the "system." Perhaps to most of you, "system," as it is now widely used, is not a new word. It is born largely of cybernetics and of engineering technology. It means a complex of components which delivers a given product in response to a given input. Let me use an example. I think the commonest system with which most of us are slightly familiar is the automobile. Very shortly it will be cold enough in the morning so that when millions of Americans go out to try to start their cars, for many it may not happen.

Each frustrated would-be motorist has to face the question of whether to sit there, push down on the starter more, get emotionally a little bit more exercise and pump the gas pedal, or whether to finally lift up the hood to see what is wrong with the system.

In terms of health manpower, we are at the point where we better lift the hood. I do not think that simply trying harder, in terms of forcing the system, is going to be adequate.

We have many reasons to consider this analogy correct. At the present time there is considerable emphasis on the analytic approach to this enormously complex system. We not only are concerned about the nature of the inputs and outputs but about the nature of all the process that goes on inside the system.

Some of the problems of health manpower which may be highlighted are the following. All require careful analysis.

1. You have to go out of the context of your jobs in the health industry in order to take a hard look at the fact that the health industry is unique in lacking really essential management systems. One may look at a hospital and wonder exactly who is in charge of it, who runs it. Is it an organization or is it a facility?

2. Look at the many complex jobs which must be accounted for under the individual physician, and ask whether or not he is the manager of a system or of a team. I think you will find that there are some amazing shortcomings.

If we compare the physician to the executive of an organization, we may find that there is a lack of middle-level manpower between him and the people who do the rather low-level jobs in his enterprise. We are able to make the allegation that, in general, the delivery of medical care and health services suffers from the lack of management application; that between the physician who may earn on the average of $28,000 a year, and the general duty nurse who averages in this country $4,500, there are almost no other echelons of people. The hospital laboratory and radiologic services are representing the exceptions. In general, between what we would have to call in the Government a GS-4 and a GS-45, there are very few or no people.

The first indication is that for revision of many jobs, being performed by the physician on the one hand and the nurse on the other, or by very occasionally, other people need to be analyzed and diversified. A whole cadre of different types of people must be developed and specifically trained for those operations in order that we utilize our physicians and nurses properly and then deliver the most for the personnel that we have in the health system.

We know we are dealing with an extremely sensitive area. Not only physicians, but nurses and many others resent the intrusion of new types of personnel and the challenge to their standards and traditions. You are facing these issues now in the business of training radiologic technologists. All of these sensitivities make it very difficult to initiate change. Other fields have long ago passed through the phase of middle manpower development.

I would like to remind you that the next time you take the jet flight, please consider the fact that the person flying the plane is not a professor of aeronautical engineering. He is a jet pilot. He is trained to do that job better than anyone else on either side of it, above or below. This is an instance of the proper diversification of one element of a highly technical job complex.

We would allege, then, that the physician works essentially in a guild system. Except for the apprentices, interns and residents that come through the system, there is a lack of management structure. The physician has not been a supervisor, and like most people who have not been a supervisor, he is very unhappy with the prospect. There is nothing unique or different in this reaction. It has been faced in industry. It has been faced in many other places.

3. We have a lack of a career ladder in health because there is no middle management structure. This is very important in developing these jobs. There is no way you can get from a lower position in this system to another one above it except to go out and start over.

The field of nursing is a primary example, if you are a practical nurse, but this does not give you any points whatsoever in becoming a diploma nurse. Or if you are a diploma nurse, this does not give you any credit toward becoming a graduate nurse. This inflexibility contrasts strangely with the systems that we find in industry or other equally complex human endeavors.

4. In looking at the next problem, recruitment of personnel, we should take a look at the high school. If you are a high school

student, you see chemistry, physics, languages, or you see many other areas beckoning as careers, but what about health? Health is something you left behind perhaps in the first six grades, when someone taught you, without much interest in the subject, something about personal and community hygiene. It may have been the coach. It may have been someone else, but certainly there was no image of a field or profession.

So here is the nation's third largest industry with no professional image when students are making up their minds what they wish to do, what professions they wish to enter. It is quite true that in the community they see the physician, the dentist and the nurse, but these are not enough. If we are to rely upon recruitment we have to do an extreme renovation of it.

All of us who have worked in public health wish for a far more informed electorate. It might be of considerable value if the average high school student knew a little bit less about Shakespeare and little more about community health requirements and so forth.

Also we would have a few more people interested in entering the health industry, because they would see it in high school as a series of professions or vocations not one, two or three, but 30 to 40 of them.

We suffer in the area of recruitment because of the lack of appropriate images. Even some of the images that are available, that, for example, of the nurse, lead young women into fields which rapidly resolve into a series of disappointing realities. Nursing becomes a field for wanting to get out of because it is full of dirty jobs at very low pay. Also, it is a field in which it is possible to move up only by getting out of it, or by going into administration and thereby leaving nursing behind.

5. Still we need to have in the health manpower field those who are going to do the personal services which could be called the dirty jobs. Would it not be better to have people who come into the health field, actually screened with regard to the fact that there are sick people involved, and sick people represent, not man at his best, but often man at his worst? Many women really come into nursing because this is a male-oriented or dominated field, (the same reason women may come into secretarial work) or so my psychologist friends tell me, and I believe they are probably correct.

6. We have many problems of poor manpower utilization in the health field. It has been variously alleged that from 30 to 70 percent of the physician's time is spent in duties which would not dignify his training. If this is true of the physician, it is also true of many, many other people in the health field.

In the military, where a different system of authority and discipline govern, and in government hospitals generally, the same tasks are performed by about half the number of people in terms of the employee-patient ratio. There are many things we could not translate from this environment to that of the private sector, but there may be many things that might help out. New kinds of manpower need to be developed. Of interest to us has been the concept of the military corpsman because this represents middle-level manpower. Some civilian counterparts may be quite appropriate in assisting the physician to discharge his tasks, removing many of the routine operations that could be well done by trained people under his immediate supervision.

These special assistants are not meant to practice by themselves out of the realm of the physician's supervision. The creation of the assistant physician of this sort is not received very kindly, as all of you know. By contrast, the concept of having someone work immediately with the physician as his assistant, and not to one side, is beginning slowly to gain support.

Endorsement of this idea of an assistant has been achieved for the first time in the instance of the higher level dental assistant. Dentists are being trained now along with dental assistants. When dentists go out into practice, they find that with the dental assistant and with extra chairs, they can serve far more patients.

We have been able to secure a degree of endorsement for an anesthesiology assistant, since it has been proved conclusively that there are not enough anesthesiologists and no prospect of training enough. There are going to be more people on the operating tables and fewer highly qualified physicians to take charge of the patient's anesthesia. The development of a person well trained for anesthesia technology is now an experiment and does have the endorsement of the requisite medical authorities. This advance is very promising.

Whether or not this can spread to the other 19 or more medical specialties, we do not know, but it has logic, and it has promise for the building of a management system of diverse new types of occupations. This has been successful in the discharge of complex human activities in industry, defense, and government. Anyone who runs an office knows what would happen if we tried to do with only top executives and secretaries, and with no one in between.

7. We have an urgent need for curriculum revisions, based upon changes in occupational responsibilities and the overwhelming technologic changes. There is more new information and consequently more rapid obsolescence in health fields than in almost any area. We need to provide not only for continuing education of people in the field, but we need to take a good, hard look at whether or not people are being initially trained for today's and tomorrow's jobs or whether they are being trained for yesterday's.

8. Another major problem in health manpower is revision of the training procedures. In addition to continuing education, there is the obvious need for retraining people who have not been in the field for the last few years. I am referring particularly to women. In the present society, it seems that Mama has left the kitchen, and she is not coming back if she can help it, after the kids have grown up and gone to college. So the arrangement for the retraining of women to bring them back into active work is of extreme importance.

We have as a major example the area of nursing, in which there are 500,000 inactives. Three hundred thousand of these maintain their licensure. I do not think it is pure nostalgia. Some of them hope to come back to work, particularly if the salary goes up to the point where it could qualify as a living wage.

Consider the figure of 300,000 inactive nurses who maintain licensure; if we really want more nurses perhaps with better salaries and an improved image, we could bring 10 percent of these (30,000 of them) back through retraining. Such a yield would dwarf all attempts at setting up training schools for bright young 18 to 22 year olds who spend, on the average, perhaps only a year and a half in the field after they graduate.

In addition to nursing we have considerable problems in the field of medical technology, where out of roughly 40,000, there are 8,000 who maintain their licensure, but do not practice.

Ventures into retraining inactives in the fields of health manpower, hopefully with a revision of the images in these fields, could possibly be far more important than the construction of everything from new medical schools to new schools for nurse training or medical technology.

The field of training in health manpower is undergoing major revisions at the present time. Pressures from many sources are tending to move training away from hospital auspices to academic systems which include hospitals. Phil Bonnett of the American Hospital Association mentioned a year ago that there were 300,000 people in training in the nation's hospitals. Now, conspicuously, the nation's hospitals are not rightly considered educational institutions in themselves. The lack of direct training support for the hospital, the requirement that cost accounting be done and that the patient be charged only costs relevant to his stay in the hospital, are all factors tending to make it very difficult for the hospital to stay in the education business on a solo basis.

At the present time legislation is pending which would support the junior college and university centers in the training of health manpower (H.R. 13196 and S. 3102). At no point is there reference to the direct support of hospitals.

It is probably advisable that hospital training, which is necessarily "on the job" and is skilled training, be coupled appropriately with a proper academic background. If the people in training have this essential academic component, then perhaps they may have the advantage of a career ladder to move forward. In other words, the person who trains in the health field should not be denied academic credit at any step by which he tries to move up in the system. Skills training alone does not make it possible for him or her to move forward in what we like to characterize as the career ladder of the future.

We would like to see more close collaboration of community centers for education and the hospital or medical center. This is embodied in the provisions of the new Allied Health Professions Personnel Training Bill (H.R. 13196) which has gone through the House and is awaiting Senate hearings (S. 3102). Such legislation would provide support to the junior college affiliating with a teaching hospital and to the academic medical center.

The overlong training process for health manpower is in need of serious revision, whether you look at the top professional levels or the supporting levels. Because of the steady accretion process, we are now turning out professional people close to, or even surpassing, age 30 level ready to start work. It might be possible that if we could effectively analyze and diversify the tasks which must be done in the health field, individuals could be trained, not to do all things in general, but to do a few things very well. They might then be graduated earlier and have the advantage which industry has recognized in the energies of young people. Also one could see the possibility, then, that they could go back at intervals throughout their professional careers for retraining and, therefore, train in terms of the current technology rather than relying on an education that is steadily lapsing into obsolescence.

9. We have a final point with regard to major problems in the health manpower field. Traditionally, the health department has been considered the center of health activities in the community.

This has evolved classically along with the idea of preventive medicine; we hope that some day the system of therapy will represent only a small part of the health system; that we will be dealing with essentially well people, not with sick people, and that where we fail, then, the hospital must take over. The current emphasis through Medicare is now upsetting this. The hospital is now having to come forward and show leadership in the community as a center for health activities.

Let us hope that the hospital can do so, but in order to do so, the hospital has to be far more mindful than it has been in the past of what goes on in the community and what brings people to its doors. In rising to a problem of health leadership, the hospital must necessarily join with the educational resources in the community, with the health department, with all of the various civic groups, in trying to meet this changed situation.

The status of our medical care and health services industry has been termed "crisis" by most of the news media; however, in spite of their predictions, Medicare's birthday did not result in great long lines of people on July 1st, and may not result in great long lines of people waiting on January 1, 1967. We don't know, but I think we are well advised that there are serious times ahead, and that the health system, like the car that does not want to start on the first sharp morning of winter requires that we look under the hood and carefully analyze the situation.

Thank you very much.

DR. CHADWICK: Thank you, Dr. Scudder. It has been very interesting to me to notice the degree to which the two discussions, the one by Dr. Scudder of health manpower generally, and that by Dr. Morgan about the manpower in our field, interdigitated. In other words, it is almost like collusion between the two discussions in the preparation.

But it is quite clear that our problems in the field of radiology are in fact a reflection of the overall problems in the health manpower field. Perhaps we can be in the vanguard, we hope, of showing ways in which this problem can be resolved.

Now, the next item on our agenda. Our Division has done a brief survey of some characteristics of the present population of radiologic technologists in this country in preparation for the conference today. A report of some of the major findings from that survey is included in the packet of materials that you received when you arrived.

Dr. Edward L. McMartin, who is Chief of our State Assistance Branch, is going to discuss this study with you this morning and review some of the important points.

Mac.

X-RAY TECHNICIAN MANPOWER

DR. HOWARD L. McMARTIN: Thank you, Don. Dr. Morgan has presented this conference with a challenge to assist in solving some of the problems which relate to the field of X-ray technology and its supportive role in the practice of radiology. Dr. Scudder has outlined the problems of competition which exist for paramedical personnel in the health manpower arena. We are meeting here these next several days to look into one small but important part of the health manpower arena and hope that this meeting will assist in answering some needs that exist in the field of X-ray technology.

A variety of radiological health programs have been initiated by State and Federal agencies with the purpose of reducing non-useful radiation exposure of patients, radiation workers, and others from the medical uses of radiation. Most such programs have placed strong emphasis on the surveillance and correction of the X-ray equipment itself. This has led to a significant reduction in non-useful radiation exposure, and continuing efforts in this area will result in further improvements.

The reduction of unnecessary radiation exposure from the medical uses of Roentgen rays is, however, a more complicated problem. It is becoming increasingly evident that to reach the overall objective, those individuals who actually operate the X-ray equipment must be competent. By far, the largest single group in this category is the medical X-ray technicians. Regardless of the quality of equipment being used, the people who use and operate it are perhaps the key to the fulfillment of our ultimate goal of maximum benefit with minimum risk.

The importance of the competent X-ray technologist in controlling exposure to unnecessary radiation in the field of medical X-ray has been alluded to many times in reports relating to this area of the practice of medicine. The New Jersey Department of Health sought to obtain information on the extent of training and experience of the operators of X-ray machines used for diagnostic purposes. In 1964 they reported:

> "If it were necessary for these 1,811 technologists to be registered with the American Registry of Radiologic Technologists to qualify to operate an X-ray machine, only 512 (31 percent) would have met the qualifications.
>
> "However, of those not registered, there are 183 who may meet the basic requirement of a 24-month radiologic technologist course. There are also 548 (30 percent of the estimated 1,811) who may meet the alternative requirement for registering by having two or more years of experience under a qualified radiologist. It is doubtful if very many of the 155 dental X-ray technologists who have two years of experience would qualify because they do not work under the direct supervision of a diplomate of the American Board of Radiology. There is more of a chance for the 62 employed by hospitals and the 331 employed by physicians to meet this requirement. Those not registered and who do not meet either the basic or alternative requirements for registration, total 518: 51 employed by hospitals, 222 employed by physicians and 245 employed by dentists."

Of 873 non-registered X-ray technologists, 366 had some professional schooling; 448 had on-the-job training only; and data on schooling or training were not available for the remaining 59.

The Department of Public Health, State of California, upon studying current X-ray safety practices and teaching in dental and medical assisting schools reported:

> ". . . The one major area of concern for which an adequate program does not exist relates to an evident inadequacy of training of many non-practitioner operators of X-ray in medical and dental practices. The basis for this concern is that

an inadequately trained X-ray operator is more likely to expose himself and patients to more radiation than is clinically necessary."

Stanford Research Institute in a survey of factors that influence the use of medical X-ray commented:

> "X-ray technologists are key persons in the radiology team and it would be useful to know more about them as a professional group. Most other health professions have been studied, but X-ray technicians have not been included in the larger national studies. The study should include information about their recruitment, educational and employment patterns, commitment to the profession, membership in professional organizations, views about X-ray technology, and knowledge and attitudes toward radiologic health practices. Such a study should also examine educational institutions and professional organizations.
>
> "The X-ray technician appears to be a key figure in the control of unnecessary radiation in medical X-rays. Because of his central position and responsibilities in the practices of radiology, more information should be secured concerning his education, training, and career patterns."

In a 1954 report of a survey of registered technologists by the American Registry of Radiologic Technologists was the following statements:

> ". . . that the key to the future of x-ray technician, to his recognition, to the fulfillment of his destiny in the field of radiology, and to the fullness of his own life, lies in his training for the work to which he has dedicated his life. Our survey, which represented 90 per cent of all technicians then certified, shows that but 52 per cent had had formal x-ray training and that under the great variety of circumstances and standards with which we are familiar. There is ample justification for the efforts of the American Society of X-ray Technicians, through their Committee on Education, to advance the adoption of a uniform curriculum, and teaching program and for the Advisory Committee of Radiologists to question the adequacy of training programs overstocked with students, neglecting to teach the basic fundamentals, or operated for personal gain at the expense of the technician."

As Dr. Chadwick mentioned in his introductory remarks, the Division of Radiological Health conducted a pilot study to determine the characteristics of practicing medical X-ray technicians. The overall purpose of this assignment was to conduct a specifically designed study which would document certain background factors and characteristics of practicing X-ray technicians. The objectives of the study were:

1. To determine the personal characteristics of the groups, such as age, sex and marital status.
2. To determine the distribution of registered versus nonregistered and full-time versus part-time X-ray technicians.
3. To determine what type of X-ray training they have had.
4. To find out where they are working and what their workload is.
5. To determine the length of time they have worked in the X-ray field, and on their last job.

We have several other questions in mind that need to be answered, but on the basis of the pilot study, we cannot answer them at this time. We cannot do more than "guesstimate" on how many X-ray technicians there are, nor can we determine the frequency with which technicians are leaving the field and for what reasons.

The study was conducted in the following manner. Practicing medical X-ray technicians were personally interviewed in different geographical areas of the country. Medical or osteopathic students and students in schools of radiologic technology were not included in the study. State Health Department personnel and Public Health Service personnel served as interviewers. These individuals attended a four-day orientation seminar in order to become familiar with the project as a whole, and to be instructed in the interview procedure in order to assure the collection of uniform data. Individual interview data are confidential. The field portion of the study (that is the interviewing of X-ray technicians) was completed in six weeks during the first two months of 1966. Participation in the study was voluntary. The collected data was transposed into working tables via automatic data processing method. Excellent cooperation was obtained with less than a two percent refusal rate.

At the outset of this study, it was decided that a sample of 1,200 practicing medical X-ray technicians from the different geographical regions of the country would produce a satisfactory cross section of characteristics. It was estimated that the "average" X-ray facility would employ two people (other than the licensed practitioners of healing arts) who at one time or another operate the X-ray unit. If then, 50 facilities in 12 States participated in the study, the 1,200 sample size would be fulfilled.

Eleven States and the District of Columbia were invited to participate, but due to the rather short notice, three of the 12 could not acquire the necessary clearances in the necessary time. As a result, the northeast area of the country was not represented and there was a reduction in the final sample size. Some of the eight participating States and the District of Columbia were requested to increase their individual samples in an effort to reach the aforementioned sample size of 1,200. This resulted in a grab sample of medical X-ray technicians, which may not be truly representative of the total "pool" but does provide broad parameters which are valuable.

During the months of January and February 1966, 1,126 X-ray technicians working in 572 facilities in eight States and the District of Columbia, were interviewed (Table 1). Ten of the interviews in nine of the facilities contained too little information to be included in the analysis.

During the planning of this study, we specified that no more than 25 percent of the facilities should be hospitals. As it turned out, 61 percent of the facilities included in the study were private offices, 24 percent were hospitals, and 14 percent were clinics, most of which were private physicians groups (Table 2). You will note we were not able to interview all the technicians at each facility because of limited time available.

Table 1.--Number of X-ray facilities and number of interviews by State

Participating States	Facilities	Interviews
Alabama	73	132
Arkansas	62	175
District of Columbia	41	78
Kentucky	74	163
Maryland	32	72
Nebraska	97	173
Virginia	29	52
Washington	55	106
Wisconsin	110	175
	572	1,126

As part of the information packet you received on registration, we included a preliminary report of the pilot study I am discussing. The figures I refer to are included in that report.

We looked at the information we obtained by the use of automatic data processing, breaking down the group by sex, full and part-time employment, and whether they belonged to either the American Registry of Radiologic Technologists (ARRT) or the American Radiography Technologists (ART) or not. Table 3 presents the breakdown of the group in these three characteristics. Two major and distinctly different groups were defined in this distribution, of almost identical size, and together comprised about 87 percent of the total group. The two groups were the full-time registered technicians (482) and the part-time nonregistered technicians (479). These two groups will be compared frequently throughout this report because they present the extremes of this paramedical group.

A look at the personal characteristics of the group indicated that about 75 percent of the total study group were female, 60 percent

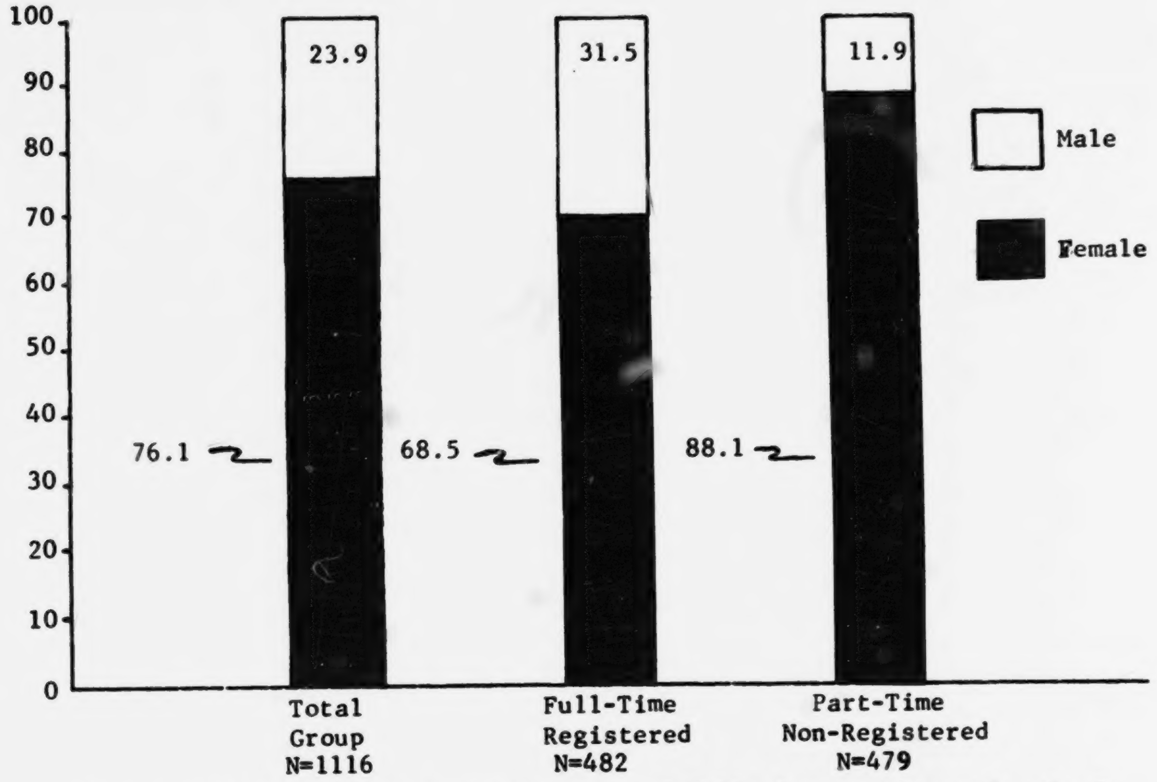
Table 2.--Characteristics of participating X-ray facilities

		Private offices	Hospitals (Number of beds)			Clinics	Total
			< 100	100-499	500+		
Facilities	No.	344	62	57	20	80	563
	%	61.1	11.0	10.1	3.6	14.2	100
Beds	No.	--	3,531	12,398	24,008	--	--
	Av.	--	56.9	217.5	1204.4	--	--
X-ray technicians employed	No.	577	156	322	155	186	1,396
	Av.	1.7	2.5	5.6	7.8	2.3	2.5
X-ray technicians interviewed	No.	487	129	234	102	164	1,116
	Av.	1.4	2.1	4.1	5.2	2.0	2.0
X-ray machines	No.	440	143	380	195	128	1,286
	Av.	1.3	2.3	6.7	9.8	1.6	2.3

Table 3.--Distribution of technicians interviewed by registration status, selected states January-February 1966

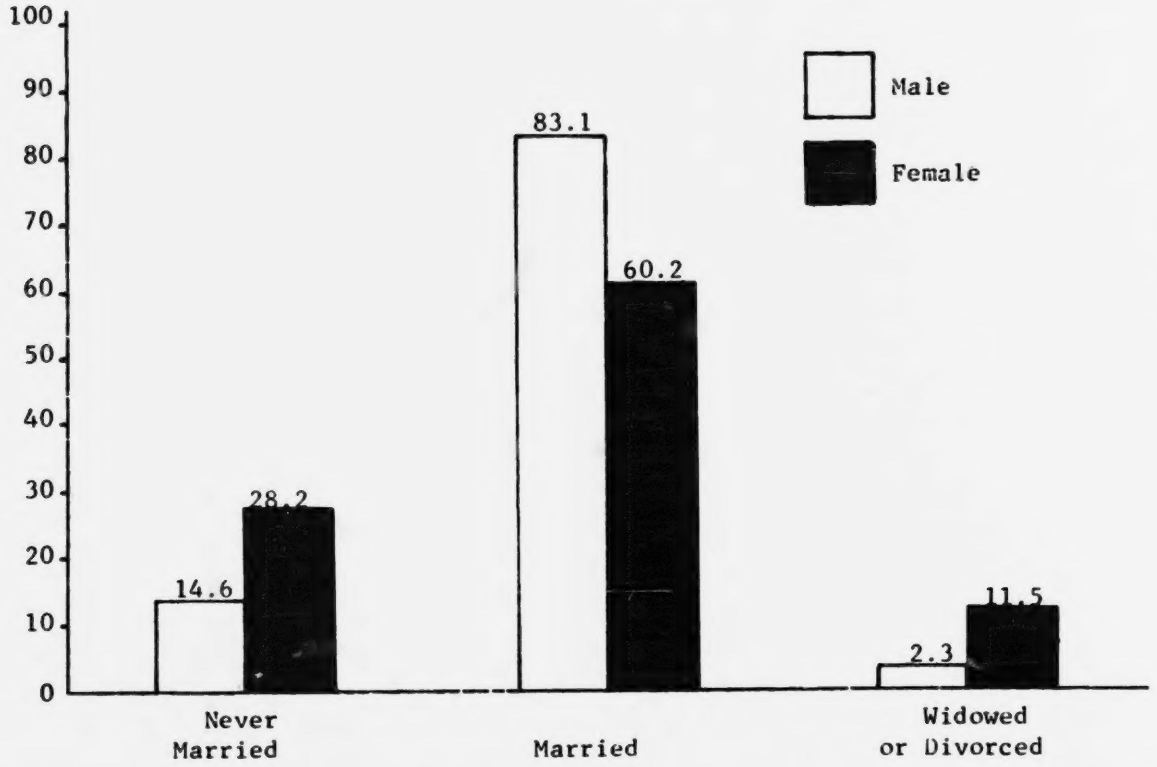
	Medical X-ray technicians						
	Full-time			Part-time			Total
	No. of males	No. of females	Subtotal	No. of males	No. of females	Subtotal	
Registered	152	330	482	21	35	56	538
Non-Registered	37	62	99	57	422	479	578
Total	189	392	581	78	457	535	1,116

of which were married. Of the men, 83 percent are married. We noted in looking at the male-female ratios of the full-time registered and part-time non-registered groups, that there were relatively more males (31 percent) in the full-time registered group and fewer (only 12 percent) in the part-time non-registered groups than in the total pool (Figures 1 and 2). We found that 57 percent of the females and 58 percent of the males were less than 35 years of age, with the males having a greater percentage in the 25-35 year old group (37 percent). The female distribution presents a smooth distribution curve with the greatest percentage being in the less than 25 years of age group (Figure 3). We looked at the age distribution of the two extreme groups and found quite a different picture (Figure 4). We note here that 68 percent of the full-time registered groups are less than 35 years of age, whereas only 48 percent of the part-time non-registered groups are in this same age group.



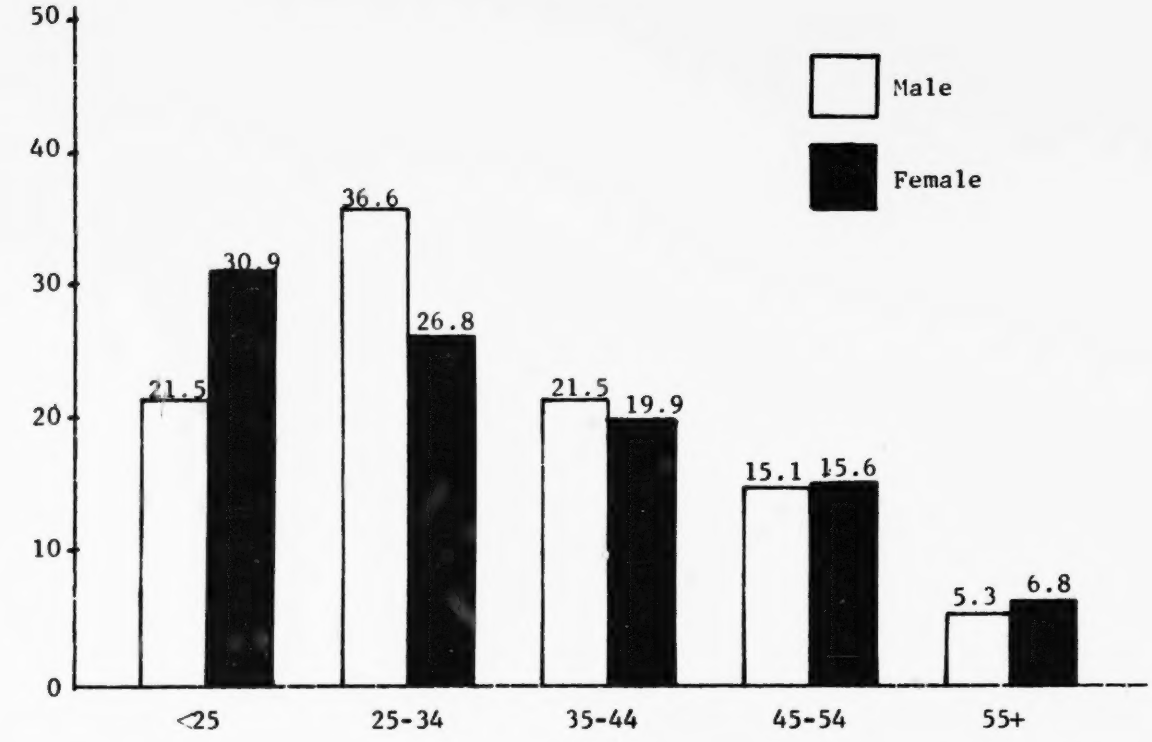
Percent distribution of total group, of full-time, registered and of part-time, non-registered subgroups of medical x-ray technicians by SEX.

Figure 1



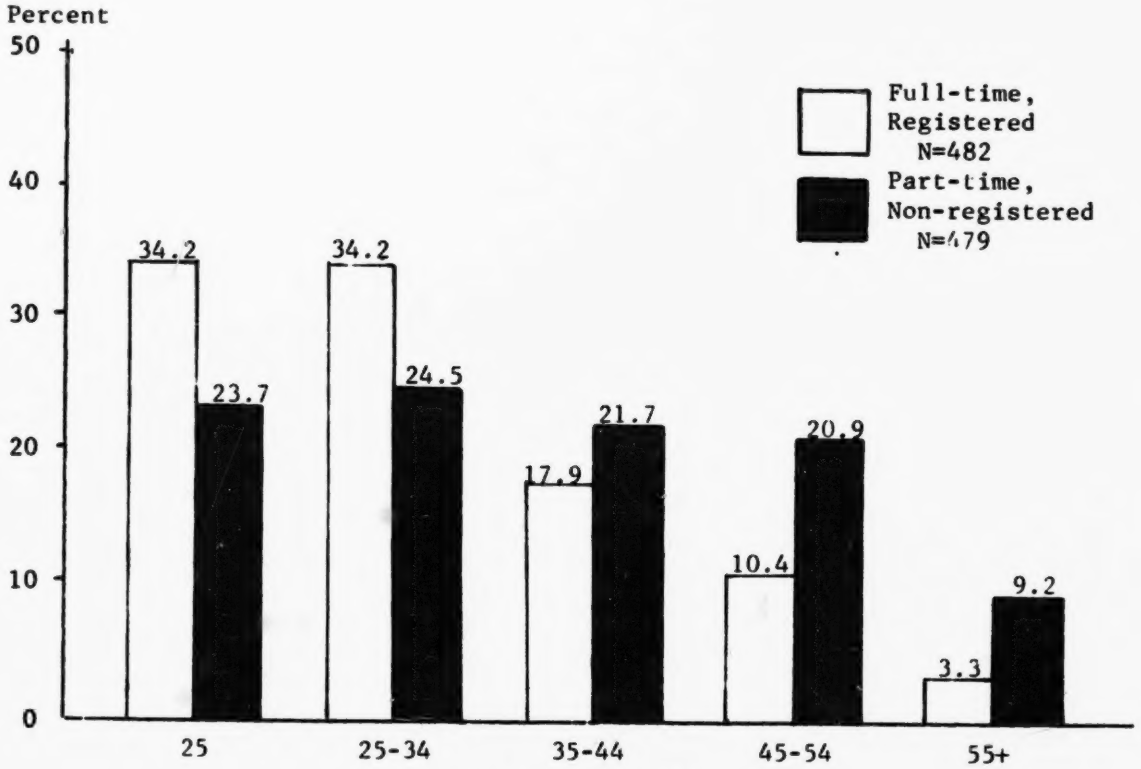
Percent distribution of male and of female medical x-ray technicians by marital status.

Figure 2



Percent distribution of male and of female medical x-ray technicians by age.

Figure 3



Percent distribution of full-time, registered and of part-time, non-registered medical x-ray technicians by AGE.

Figure 4

Before we discuss the training and workload of the group, let us look at the principal occupation of the part-time technician--535 of them without reference to their registration. Of the males, 78 of them (68 percent) were either principally employed as X-ray technicians or medical laboratory technicians. On the other hand, of the 457 females in this group, 58 percent were employed principally as a nurse or a physician's assistant (Figure 5).

Probably one of the most important aspects of this study, and one in which we all are interested, is the type and amount of formal X-ray training that was reported by the groups. A distinct difference was noted in the amount of training received by the full-time registered technicians compared with the part-time non-registered group. Formal X-ray training is defined as a planned program (with a predetermined curriculum) of training in an approved or non-approved school of radiologic technology, and excludes on-the-job training.

We found that 95 percent of the part-time non-registered technicians had no formal X-ray training whatsoever. On the other hand, 75 percent of the full-time registered technologists had two or more years of training and an additional 17.5 percent had between one and two years of training (Figure 6).

The type of training received included diagnostic X-ray only (16 percent), X-ray and therapy, 46 percent, while 34 percent received training in radioisotope procedures as well as X-ray and therapeutic techniques. Insofar as other education is concerned, we note that three percent had not graduated from high school, about 60 percent had no college education, and that seven percent to eight percent had four or more years of college.

We are not able to assess the quality of the training that was obtained by the group in the study although we did obtain the names of the school attended.

Another question we wanted answered was "Where are these technicians working; how long have they been working, and what is the character of their workload?" Again, we found that the two principal extreme groups provided a good means of comparison.

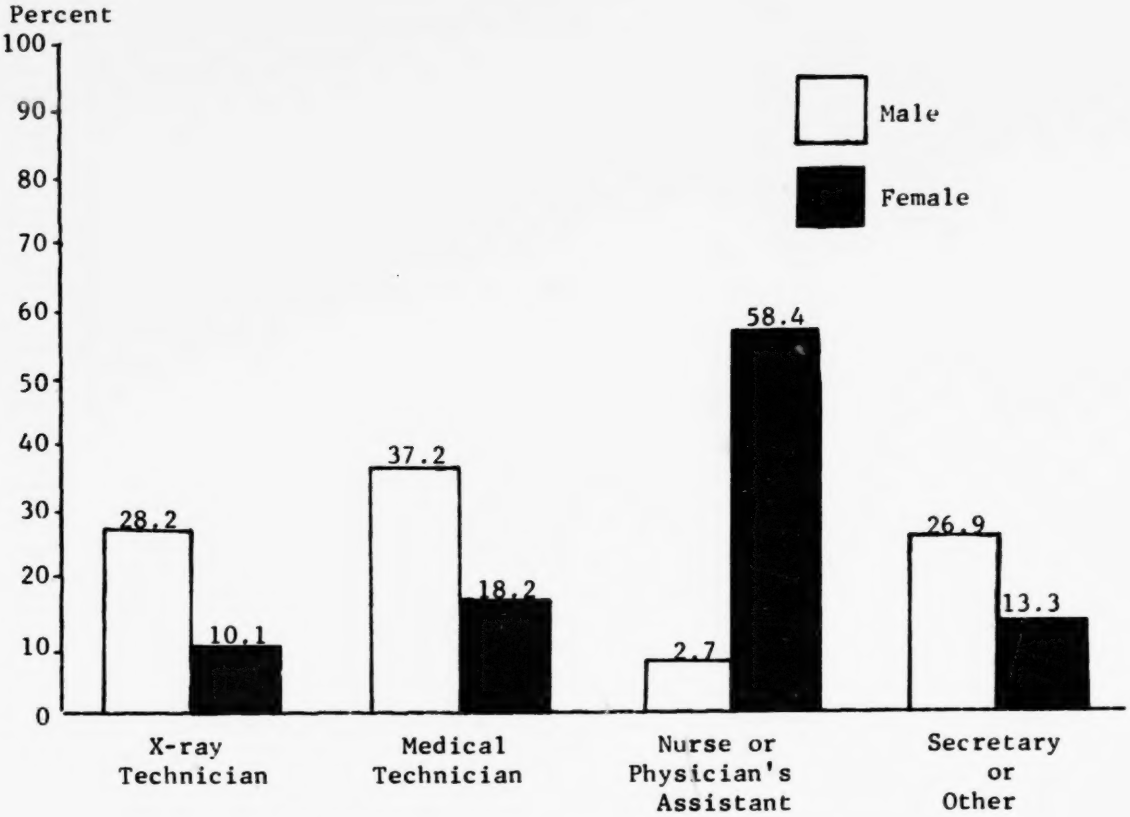
Sixty-seven percent of the full-time registered technicians work in hospitals; practically all of them in hospitals with more than 100 beds. Of the part-time non-registered technicians, 86 percent work in private offices and clinics. Of the 65 (14 percent) who work in hospitals, 55 work in hospitals with less than 100 beds (Table 4 and Figure 7).

Dr. Morgan mentioned that one of the problems encountered in radiology was the rapid turnover of trained personnel. In an effort to get a fix on this problem, we asked each interviewee how long he had been in X-ray work and also how long they had been working at their present location. The nature of our study precluded obtaining information of how many left the field for other work and for what reason. This should be considered as an important item to be studied in the near future.

Again, we used our principal extremes for comparison. Among the full-time registered technicians, we noted that about 40 percent had been in X-ray work less than five years; about the same percent had been in five to 15 years, and almost 20 percent had been working in X-ray more than 15 years (Figure 8). On the other hand, 57 percent of the part-time non-registered technicians have been in the field less than five years, about 29 percent, five to 15 years and 14 percent, more than 15 years.

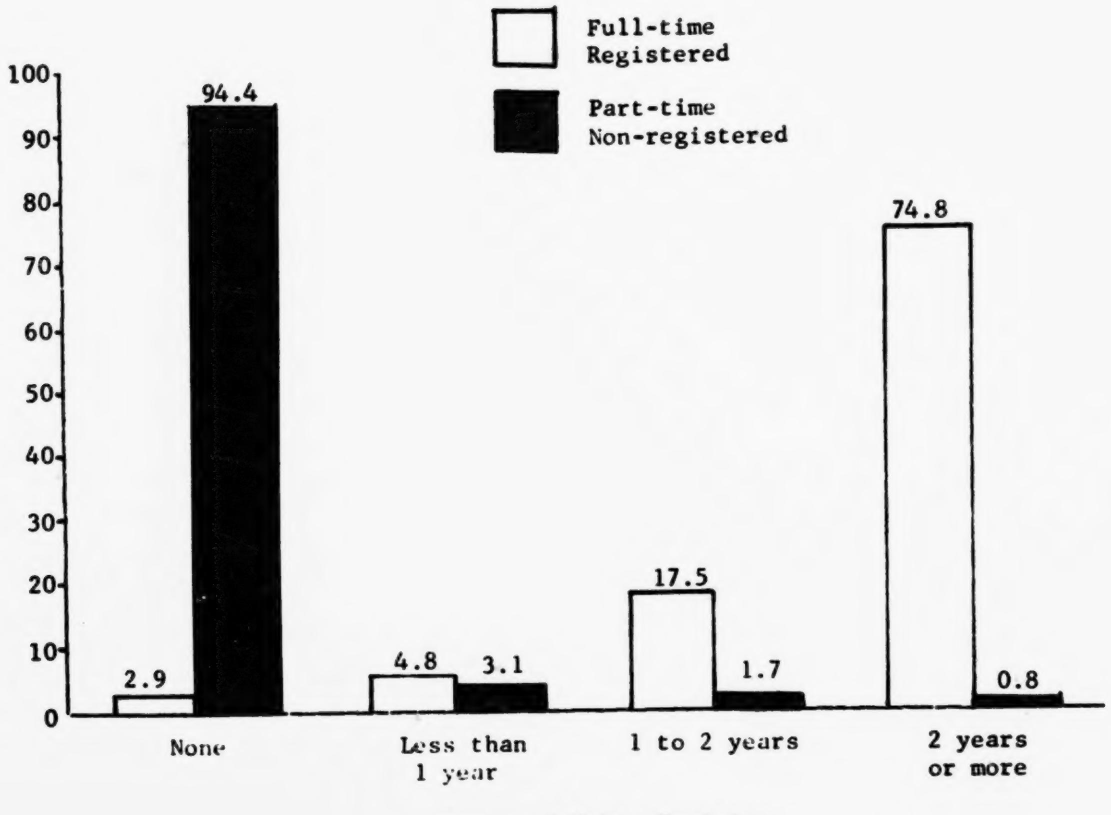
Insofar as the length of time at their present location is concerned, we note that while only about 40 percent of the full-time registered technicians have been in the field of X-ray less than five years, 65 percent have been in their present job less than five years. On the other hand, the length of time that the part-time non-registered group have been in X-ray is practically identical to the length of time they have been in their present job.

We do not have any information as to the number of people who have been trained in X-ray technology and have subsequently left it for another job. I was informed by the executive secretary of the American Registry of Radiologic Technologists, that of the present 46,000 registrants, about two-thirds or 30,000 are presently unemployed in X-ray work. If this is true, we have 16,000 who were at some time working in X-ray work and now do



Percent distribution of male and of female part-time medical x-ray technicians by current occupation.

Figure 5



Years of X-Ray Training

Percent distribution of full-time, registered and of part-time, non-registered medical x-ray technicians by years of academic x-ray training.

Figure 6

Table 4.--Place of employment

Category of medical X-ray technician	Private offices	Hospitals (Number of beds)			Clinics	Total
		< 100	100-499	500+		
Registered:						
Full-time	101	47	209	72	53	482
Part-time	16	15	4	6	15	56
Non-Registered:						
Full-time	25	12	18	17	27	99
Part-time	345	55	3	7	69	479
Total	487	129	234	102	164	1,116

Percent Distribution of Registered, Full-Time and of Non-Registered, Part-Time Medical X-ray Technician by Place of Employment

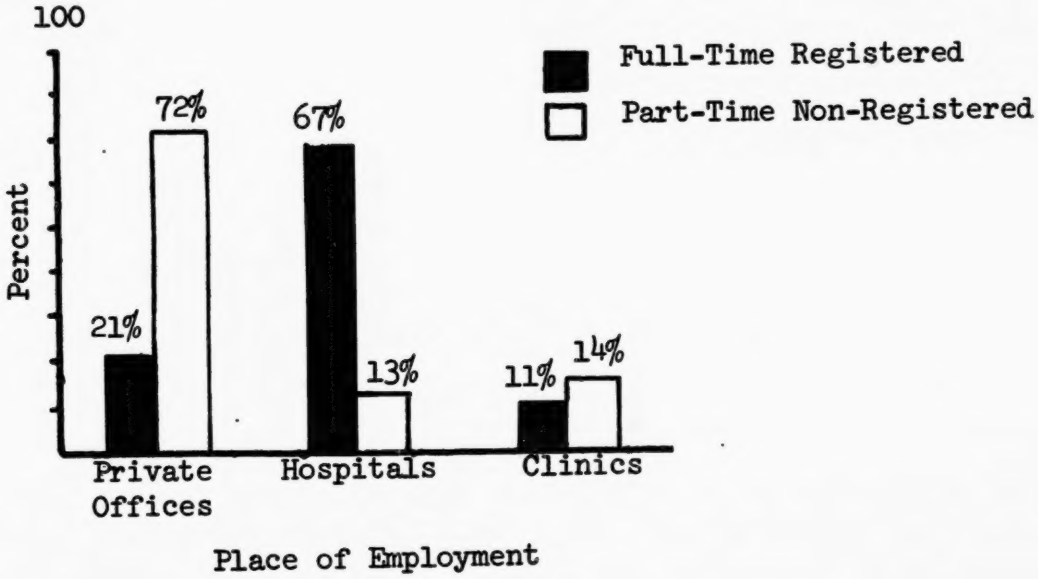
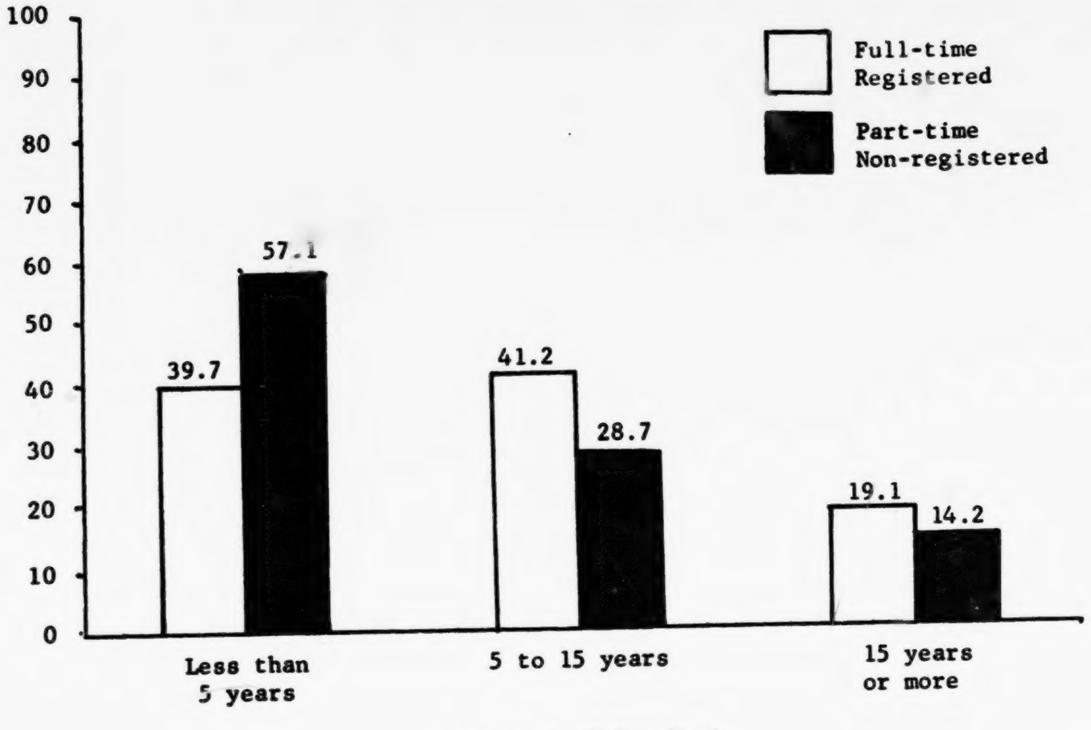


Figure 7

something else. Perhaps we should consider looking at this group for possible answers to some of our turnover problems.

There was again, as expected, a distinct difference between the workload of the full and part-time extreme groups we have been comparing. We found from our study that 95 percent of the part-time non-registered technicians had fewer than 50 patients per week and 83 percent of the same group reported that they took only one to two exposures per patient. On the other hand, 65 percent of the full-time registered technicians X-rayed 50 or more patients per week and 73 percent of this same group handled case loads requiring three or more exposures per patient. This was expected in view of the fact that the full-time registered technologists tend to work in hospitals where more difficult problems are seen and more sophisticated work is done.



Percent distribution of full-time, registered and part-time, non-registered medical x-ray technicians by number of years in x-ray work.

Figure 8

In summary, we have looked at a small group of our paramedical community in eight different States and the District of Columbia, through a pilot study of over 1,100 X-ray technicians who were interviewed during a 6-week period in January and February 1966. Seventy-five percent of the group were female, more than 70 percent were married and more than 50 percent were less than 35 years of age. Two distinct and different groups were found and compared. The full-time registered technicians were employed in large part in hospitals where their case and workloads were higher; 75 percent had two or more years of X-ray training and an additional 17.5 percent had one to two years of training.

The other group, part-time non-registered technicians, tend to be employed in private offices and clinics (87 percent), sees fewer patients per week and carries out simpler procedures. Less than five percent of this group have had any X-ray training.

Several questions have not yet been answered. One of them is: "How many technicians are there in the United States at present?"

We found that in the information we obtained about each facility, that there was approximately a 1:1 relationship between the number of X-ray machines in the facilities included in this pilot study and the number of X-ray technicians employed. Using this information and information available elsewhere in the literature, we can make an estimated guess as to the number. On this basis, we would estimate that there are between 75,000 and 100,000 X-ray technicians in the total pool.

On the other hand, we can make an estimate on the basis of the number of persons now belonging to a registry. We have been informed that approximately 30,000 members of the ARRT are now actively employed in X-ray work and another 5,000 members of the American Radiographic Technologists are in the field. This group may constitute anywhere from 40 to 50 percent of the total pool. On this basis, we arrive at a number in the neighborhood of 70,000 to 90,000.

Regardless of the number, about 50 percent of them belong to a group not represented here today; they are dislocated in single offices, have other important (to them) things to do, and are untrained in X-ray technology. This is a group who sees fewer patients, but regardless of that, are important and must be recognized. We are going to have them with us for a long time and I trust that we will not close our eyes to their needs. If, before you leave, you can help us come up with a way of getting to this group and increase their understanding, interest and skills in X-ray techniques, we will have accomplished a difficult and important task. Thank you.

DR. CHADWICK: Thank you, Mac. We now have a coffee break.

While the few remaining people are sitting down, you might be interested to know that there are 302 persons registered for the conference thus far. We are going to have a list of the persons registered available just as soon as the names can be transcribed and typed out.

In our session between now and lunch, we would like to look at some of the efforts that have been carried on to establish standards, qualifications, for persons in the field of radiologic technology. As you will see by the program, there are a number of different techniques for doing this that are represented by the speakers in this session.

First, we have a discussion about the registration program. And that will be given by Mr. Roland C. McGowan who is the Executive Director of the American Registry of Radiologic Technologists.

Mr. McGowan.

RADIOLOGIC TECHNOLOGISTS--PROFESSIONAL DEVELOPMENT AND REGULATION

MR. ROLAND C. McGOWAN: Thank you, Dr. Chadwick. As I stand here surveying this fine array of distinguished and renowned personages, I am aware that my assigned task today is, indeed, a most formidable one. It must be evident that the challenge presented to this assemblage--that is, the training of radiologic technologists--will have benefit here of consideration by a group certainly well qualified. The experience represented by this group in this particular field is evidenced by the presence of so many who have been active for years in professional organizations which, since their inception some 30 years ago, have been dedicated to this very subject.

This convening presents an extraordinary opportunity, an accumulation of talent such as is here represented should provide an excellent approach to a problem needy of your consideration. I would ask you to pause and reflect upon two things.

First, the technological ch[illegible]hat have occurred in the field of radiolog[illegible]nnology.

And, secondly, the phenomenal rate at which adequately trained technologist are actually being introduced into the field.

The field has changed, and is changing, at a fantastic rate. Specialization of procedures, complication of equipment, is occurring at a rate difficult to comprehend. This specialization is no longer confined to the large metropolitan medical centers. Modern communication and transportation facilities allow for the rapid diffusion of modern techniques to all areas. A procedure developed today in one area may be practiced tomorrow in another area far removed.

It is obvious, then, that the effect of this specialization and complication upon the quality of personnel needed will not be confined to certain areas, but will be felt throughout the field. These changes are drastically affecting the type of personnel needed. Where the lesser trained could satisfy the limited needs of certain areas some years ago, the highly trained and experienced are now required.

The experienced technologist is in dire demand, which emphasizes that the qualifications of a competent technologist, who can satisfy the needs of today's complex profession, cannot be provided without allowing for the learning process of every day experience in the performance of technical procedures. Unfortunately, this takes time. But there is no substitute for experience in the professional development of the technologist, just as there is no substitute for didactic training.

The American Registry of Radiologic Technologists has been vitally concerned with qualifications of radiologic technologists for over 30 years. These 30 years have witnessed tremendous growth; but more important, have witnessed the universal acceptance of ARRT certification as evidence of proficiency. The certificate is the only one recognized by organized radiology, and its widespread recognition extends not only throughout this country, but all over the world.

This recognition was not accomplished easily. It has required dedication and persistence. It came about through cooperation and close association with organized radiology so that the needs of radiology have been recognized. It has come about through early and continuous rigid enforcement of requirements and standards; by continually reviewing and upgrading these standards as the needs of the field dictated. It has come about through extensive and thorough review of each examination to maintain it at the highest possible level of quality. It has come about through demanding adherence to standards for professional practice in each annual renewal of certification.

As this recognition has expanded, the Registry has grown some 84 percent, from 25,000 registrants to 46,000. In the beginning of this period, the annual rate of growth was 10 percent. That rate has now increased to 11 percent. In other words, we're increasing at an increasing rate.

In the same six-year period, the number of approved schools has increased 39 percent, with an increase in student capacity of 89 percent. The student capacity of AMA approved schools now stands at over 12,000. Also, the annual increase in number of approved schools has jumped from seven percent to 14 percent. The number of schools is also increasing at an increasing rate.

With this phenomenal rate of growth, it is evident that there must be other factors to be considered to explain today's shortage. I would, however, point out that the magnitude of this shortage can not be estimated without a broad study of the needs, such as has been recommended in the NACOR report.

Of the 46,000 registered technologists presently in good standing, over 73 percent are female, and this ratio has remained about the same for years . . . perhaps the percentage of female has even increased slightly. As noted in the NACOR report, experience has shown that the majority of female technologists remain active in the field for only three or four years.

Also, we estimate that approximately one-third of those in good standing are not actively engaged in professional practice. It is evident, then, that the field is not attractive to the male. The low salary scale traditional to the field does not appeal to the young male who must contemplate supporting a family in today's inflated economy. Security and the self-satisfaction of tending the sick lose their appeal when viewed in light of the dollars and cents required to manage a decent living today. Higher salaries would bring more men into the field who have the needed continuous career pattern.

Certainly, the introduction of lesser-trained into the field would make it only less attractive. Such attempts in some of the other paramedical fields to alleviate shortages have certainly not provided the solution expected.

So when we consider "what it will take to provide adequate numbers of appropriately qualified operators of X-ray equipment," let us also consider what may be expected of these "operators". Not only to understand anatomy, physiology, electronics, physics, mathematics, nursing, mechanics, photography, teaching, public relations, personnel management, et cetera, but also to accept the responsibility of ethical professional practice which they, along with the patient, according to the dictates of their own conscience, must maintain at a level to insure that public health benefits rather than suffers from this wonderful ray.

Thank you.

DR. CHADWICK: Thank you very much, Mr. McGowan. Again, we can see the similarity in the questions that are being raised. And the assignment for the discussion groups this afternoon, at least in my mind, is becoming clearer and clearer.

Further thoughts on this subject now from Mr. Leslie Wilson who is President of the American Society of Radiologic Technologists.

MR. LESLIE WILSON: Thank you, Dr. Chadwick. Ladies and gentlemen: It is my pleasure to represent the American Society of Radiologic Technologists, the organization for professional technology in this country. We are certainly happy to be here. We are even more pleased to see the concern for technology manifest here. A concern that has been the guiding light for the members of The American Society of Radiologic Technologists since 1920.

The goal of this conference is to establish means of providing sufficient technologists with sufficient qualifications. For nearly fifty years the Society has exerted its entire energy toward establishing suitable educational standards for technologists and recruitment for the profession. We are well qualified to discuss the inequities and shortages in both. We live with them.

We believe it possible to promote the stature of technology through education--not organized bombastic challenge. This attitude is well founded. It has promoted respect for the American Society; it has provided standards for education of the technologies relating to ionizing radiation, but it has not always proceeded at a pace consistent with requirements for the expanding scope of technology nor satisfied all the needs of technology.

We do not want to see this sound philosophy of education usurped by State legislative requirements which, because of the inevitable partisan problems, will diminish standards. Instead, we seek aid to implement acceptable criteria for both training and employment. The means of implementation already exist in the bodies now concerned with these problems. These criteria require:

1. Upgrading of present programs through more instruction in the basic sciences such as dissemination of sufficient radiobiology information to be certain that those utilizing ionizing radiation have sufficient background in this area.
2. A more organized system of postgraduate education to provide for education of administrative and teaching technologists.
3. Stringent inspections of training programs.
4. Easy access to accreditation bodies so that standards are constantly reviewed and more rapidly accommodated to the expansion and needs of the field.
5. Greater recognition of the technologist and commensurate implementation of salary levels.

The Society is justly proud of the part it has played in the establishment of the 24-month AMA-approved schools and the curriculum it has provided for these schools. It cannot be denied that technology is at its all-time high in quality and quantity and growing better and bigger.

Without these programs it would have been, and will be, impossible to fulfill the demands of the field. Any effort to discontinue or downgrade these programs will result in chaos. Their value is a matter of record. To say that changes are not needed would indeed be false.

The first concern of all the participants in this conference should be the continuation and upgrading of these 24-month, 4,000-hour, hospital-based programs of radiologic technology. Despite criticism, we believe that a curriculum heavily oriented to clinical hours is necessary.

Repeated clinical application by the student under adequate supervision is the only means of reducing multiple and unnecessary "repeat" studies--one of the greatest contributors to unnecessary radiation exposure.

Postgraduate education is a rather glorified term for the measures we have provided. The Society, and most of its affiliates, have accepted the responsibility of sponsorship of short courses and seminars. We are proud of our contribution to continuing education but seek a means of instituting more formal programs, which would answer the urgent need for qualified instructors and administrators. Currently, the predominant number of these are trained by way of preceptorships.

It is difficult to find the "umbrella" to cover the curriculum which would conceivably produce the "master technologist." Accommodating science courses to business management and personnel courses, along with education courses per se presents a stumbling block to the individual seeking to establish a degree program in a university environment. This effort should continue--we need the help from professional educators.

Simultaneously we cannot sacrifice the technical "know-how" needed by these individuals. Patient care remains the prime responsibility of the technologist. Final judgment of a technologist's qualifications will still be determined by his ability to perform in a clinical setting.

But the well-qualified technologist, with added and well-prescribed formal education, as an instructor could strengthen the 24-month program. This individual is currently in short supply--we have been unable to consistently suggest that his economic status would improve because of his added qualifications.

We have been interested in the suggestions relating to the establishment of Schools of Allied Health Sciences in large universities. The theory of presenting basic science subjects common to all the disciplines allied to medicine in large groups and later in the course allowing specialization in the chosen field would certainly appear suitable for education of larger groups with a more efficient utilization of instructors.

It is also argued that such a composite base program allows each student to better identify with his fellow workers on the health team. While most of these programs are still in the planning stage, it behooves us to pay careful attention to them.

One of the primary concerns of this conference is the stated critical shortage of well-trained technologists. It is difficult to conceive such a shortage in a profession with a possible annual graduate rate of 6,000.

Needless to say, this shortage is aggravated by, possibly caused by, the transitory nature of the technologists in the field. Marriage and pregnancy take a heavy toll in a field populated largely by females. Many graduates never practice after graduation or practice for only one to two years.

It would then stand to reason that employment of the male would lend stability to technology for no other reason than their traditional role as breadwinners and more stable portion of the work force. Yet, this is not possible.

Male technologists, those who would become the teachers, the administrators, the supervisors, the long-time professional technologists, desert the field in great numbers. This, combined with the attrition rate among the female technologists, presents a problem of no little magnitude.

It must be added that certainly not all our female technologists depart technology for marriage. Why the attrition of these individuals from the field? And why is the field unattractive? There are three primary reasons:

1. Salaries.
2. Lack of opportunity for advancement.
3. Status and prestige.

It is somewhat ironic that many of our technologists work at wage levels little above what President Johnson has declared a poverty level. Even length of service or experience has limited rewards. Dedication and service to mankind, while motivating influences to the professional technologist, hardly pay his bills.

The changes for upward mobility in the allied health professions are severely limited as are the chances for advancement within the profession itself. If the individual is fortunate enough to succeed to a higher position as a supervisor, chief technologist, et cetera, he, too, often finds that his compensation is not comparable to that in industry and business. This is difficult for him to comprehend since health has become "big business."

In short, there is little provision for advancement, little to look forward to, and job dissatisfaction sets in.

The lack of recognition accorded the technologist is discouraging. He is beset from all sides about professionalism, ethical conduct, the obligations in the service of mankind, yet he is accorded little recognition for his efforts.

While professional societies have given recognition to the R.T., and sometimes only a "lip-service" type of recognition, in too many instances the individual members of these organizations have withheld their recognition. Again, it is somewhat ironic that in the report prompting this conference, while stating the importance of technologists, it would appear there is a feeling that technology is not, nor can be, professionally oriented.

These same reasons hinder the recruitment of students of the caliber to which ionizing radiation and its application can be entrusted. Attempts to secure individuals other than those possessing the highest levels of intelligence, aptitude, character, and social adjustment is a disservice to all concerned. Medicine, technology, and above all, the patient, deserve this type of individual.

Until these inequities are corrected and our training schools and standards are upgraded, we will not be able to consistently attract and keep the young people we need in this field--no matter how much money or time is expended on recruitment. How many TV clips, posters, and the like, have you seen urging "Become a Physicist" or "Be a Veterinarian"?

The establishment of programs of lesser standards will do nothing to alleviate the chronic problem of transience within the profession. It would only aggravate an already bad situation which is well on the way to becoming intolerable. Nor would their establishment aid in recruiting individuals. Our obligation is to furnish technologists of greater quality as well as quantity.

There has been past discussion of technical assistants, junior technologists, call them what you may. The Society has steadfastly opposed such a category. The predominant need is for the well-trained R.T.

It has been argued that a fully trained technologist is not needed in rural areas, smaller hospitals, doctors' offices, and on and on. This is totally fallacious, and I speak from experience. For it is in these situations with minimal supervision and little contact with his peers that the technologist must rely upon a solid background of technological training.

It has been said that these individuals could be limited to the type of examinations they could perform, but this would be impossible to monitor and the end result would be a weakening of technology and substandard patient care. It is wrong to penalize a patient with second-rate care because of his geographic location. It is wrong to put ionizing radiation in the hands of these purposely ill-trained individuals.

How many in this room would wish to have radiation applied by an individual stintingly trained?

Mr. McGowan and I were asked to discuss professional development and regulation of radiologic technology. The foundations for both have been soundly laid. We believe the long-sought and hard-won 24-month AMA-approved program will provide suitable training for staff technologists. We believe that formal education for the teaching and administrative technologists is desirable, but financial resources must be found for education and parallel economic gains for these individuals.

The examination and certification of technologists by the American Registry has been an effective means of establishing and maintaining qualifications of trained technologists. Recognition of this certification and the qualification it supports has been won by the combined efforts of radiology and technology. It has and will continue to contribute to the stature of technology.

We believe that the American Registry has the integrity and the fluidity to properly evaluate, examine, and attest to qualifications of technology both now and consistent with the changing and expanding demands of the profession.

Implementation of this certification would be of advantage to both technology and good patient care. It is paradoxical that while a portion of the country is calling for means of protecting the public by licensing those utilizing ionizing radiation, other governmental agencies are publishing job requirements for technologists based on standards long out-dated and unsupported by organized medicine or technology. I refer specifically to requirements used by the Board of U.S. Civil Service Examiners in Announcement Number PH-133-1 (64).

The accomplishments of the organizations concerned with the professional development of radiologic technology have proven their worth and abilities beyond a question of a doubt. That the R.T. bestowed by the American Registry of Radiologic Technologists, which is jointly sponsored by the American

College of Radiology and the American Society of Radiologic Technologists, is looked upon as a mark of excellence throughout this country and the world is an indisputable fact. That deficiencies exist cannot be denied.

We believe it would be wasteful both in time and money to set up any other bodies to supervise the professional development of radiologic technology. However, we would seek support for the principles so hardly won.

The following criteria should be met:

1. Implementation of the present 24-month hospital-based programs;
2. Establishment of postgraduate education to increase the number of teaching and administrative technologists;
3. Implementation of the inspection of training programs; and
4. Increased lines of communication to accreditation bodies; then the problems facing this conference can be diminished, if not eliminated.

Technology has literally pulled itself up by the boot straps to this point in time. We have benefited through the prestige of sponsorship by the American College of Radiology. We certainly would not belittle their help, nor certainly that of our dedicated predecessors who have brought us thus far.

But to increase the number of schools for training; to increase the numbers of trainees; to implement salaries for the well trained and educated; to keep pace with the escalating demands for health services, we are delighted to have the manifest interest of the United States Public Health Service.

We would be pleased to collaborate with them in determining facts: facts relating to qualifications, facts relating to the number of technologists needed now and ten years from now, facts relating to resources needed, facts relating to environmental and economic requirements that will provide incentive to high school graduates to enroll in technology programs, facts regarding utilization of equipment and just where controls should be established to safeguard the public.

A fact-finding commission sponsored by the Society and perhaps funded by the United States Public Health Service would be of inestimable service in providing direction to the measures to be employed.

We believe that these concrete facts will emphasize the basic concept upon which the Society was founded, that education will promote the future of technology, provide better patient care, and simultaneously point the need for funding for post-graduate education, conferences, and expanded training programs.

Thank you.

DR. CHADWICK: Well, thank you, Mr. Wilson, for some straight talking. I am sure that this discussion has provoked in many of your minds a good deal of question and comment. May I remind you that we have not provided facilities for questions at the major session this morning. The discussion groups this afternoon are planned for exactly that purpose. The role of this morning's session is intended to raise the questions. This afternoon we should look to some of the answers.

I think that Mr. Wilson has certainly given us a lot of food for thought for this afternoon. There have been several references to the AMA accreditation program. We have with us this morning Dr. Taylor who is Director of the new Department of Allied Medical Professions and Services of the AMA and who is also Associate Secretary of the Council on Medical Education of AMA. Dr. Taylor is going to discuss the program with us.

Dr. Taylor.

A.M.A. X-RAY TECHNICIAN TRAINING

DR. TAYLOR: Thank you, Dr. Chadwick. Ladies and gentlemen, I would like during this next fifteen or twenty minutes to close the lid on this Pandora's box. Or, another way of putting it, turn the coin over and look at some of the brighter things that have happened.

I am becoming more and more disturbed as I travel around the country and participate in conferences such as this one by the urgency that is usually expressed regarding health, regarding supply of health personnel, regarding the kind of care our people are getting. I am a little surprised that all of a sudden this happens to be paramount in most people's minds. Someone has done a good selling job. It is a popular topic of conversation.

This conference brings together a group of people to focus for a day and a half or two days on a topic that a lot of other people have been talking about and thinking about and devoting a great deal of attention to for a number of years, and will continue to do so. The success of this all depends upon what do we do when we leave? If we go back to our own little shops and we continue carrying on the work that we have been doing, then, this has only been a pleasant two days.

However, I was not asked to philosophize. Rather, I was asked to talk with you about the American Medical Association's program of accreditation in X-ray technology.

Let me begin by saying that in 1847, there were two signal events in the United States.

One, the first postage stamp was issued. And secondly that this was the year in which the American Medical Association was founded. It was founded for the purpose of elevating medical education and medical practice in this country. One of the first committees appointed by the AMA at its founding was the Committee on Medical Education. The present Council on Medical Education is a direct descendant of that original committee and the original founding purpose of the American Medical Association.

For the first 75 or so years, the AMA was concerned with medical education, that is, with the medical schools in this country. You may recall many of the early surveys that were done of the commercial schools, the diploma schools, the diploma mills, that were in operation in those early days. This was culminated in 1910 by a report supported by the Carnegie Foundation known as the A.M.A. and the "Flexner Report." The number of so-called medical schools that were closed or were closing from 1900 to 1915 is a very interesting chapter in our history.

About the 1930's, it became evident that physicians needed more and more technical, semi-professional, and professional assistance in providing the kind of health care that they were being taught to give in the medical schools.

I use the example of the medical technologist and the pathologist as typical of what was happening. The same is true for several other areas. There was a time when each physician took care of his own clinical and anatomical laboratory work.

Finally a few physicians decided to concentrate their medical work in this area. They became the pathologists. They were of service to other physicians and their patients.

Soon the pathologist decided that he needed technical assistance, and trained one or two youngsters to work in his laboratory. Quite obviously, what happened was that Dr. A stole one of Dr. B's technicians. This has been going on ever since.

Dr. A then began training more technicians. In this way he served his fellow pathologists as well as all of medicine.

The beginnings of the schools of medical technology were with us. At first these were sort of hit and miss, on-the-job training, unstructured, with little uniformity in types of schools. There could be no assurance that a student trained in one school had the same type of educational or training experience that another student had had.

So the pathologists and medical technologists, or medical technicians or laboratory technicians as they were called, decided that some type of standard should be developed. This was the beginning, then, of the first "essentials" for training in one of the allied medical areas. Subsequently, minimal training essentials have been developed by the AMA for occupational therapists, physical therapists, X-ray technologists, cytotechnologists, inhalation therapy technicians, medical record librarians and technicians.

The physicians who were directly concerned with the performance and the activity of each of these several technical groups came to the Council on Medical Education and expressed a concern for the training of allied medical personnel similar to that expressed some 75 years before about the training of medical students. It was on this basis, and in collaboration with the medical specialty group and the technical or professional association that the Council on Medical Education developed minimal training essentials. These essentials are put together, not by the Council on Medical Education, but collaboratively between the associations representing all of medicine.

These essentials are worked over very carefully, approved by the organizations concerned, and then transmitted to the House of Delegates of the American Medical Association. The essentials are then subject to further review and action. In this way, all of medicine has a stake in the training of X-ray technicians--not the radiologist alone, but the pediatrician, the psychiatrist, the internist, and the general practitioner. Specifically, in X-ray technology, the primary responsibility for training--as far as medicine is concerned--lies with the radiologists.

Once minimal essentials are established (a copy of the minimal essentials for AMA-approved training programs in X-ray technology) they are not "frozen". They are continually under survey, under study, and are subject to revision. In fact, the essentials for X-ray technology were revised last in 1960. I suspect it won't be long until there will be some revisions made again. The same holds for the other seven areas for which minimal essentisls have been approved by the House of Delegates.

Turning now, to accreditation or approval, we are one of the very few countries, if not the only country, in which educational programs are judged by the concerned profession and by the peers in that particular educational area. Most other countries have governmental regulation, governmental approval, governmental accreditation. We feel in this country, or we have felt up until now, that it is an obligation of the profession concerned to evaluate and to give the stamp of approval or withdraw the stamp of approval of educational programs and that this should be done by those most knowledgeable in the field and standards should be subject to revision by growth and development in the field.

The National Commission on Accrediting was established in this country by the American Association of Universities to regulate accreditation. There are six Regional Accrediting Associations for Colleges and Universities. The Council on Medical Education is recognized as the accrediting agency for the eight allied medical programs listed previously.

I should make another point: AMA's accreditation and approval programs are voluntary. No one says that this or that program for training X-ray technologists must be approved by the American Medical Association. But some other agencies may have that requirement. For instance, the Registry that we have just heard about does have a requirement that only graduates of AMA-approved schools can sit for the Registry examination.

Many States will issue licenses only to graduates of "approved schools." Most of these States accept the approval or accreditation of the American Medical Association as the "approval" although they retain the right to carry out their own inspection of schools.

Once a school or a training program director and his faculty decide that they want AMA approval, they write for a pre-survey form or they write in for the application form for approval. This is completed and returned to the AMA.

Let us consider what happens in X-ray technology, as an example. The completed application form is sent to the Committee on Technician Training of the American College of Radiology. Again, the Council on Medical Education recognizes that its members are not the peers in the training of X-ray technicians. We rely upon the American College of Radiology and the American Society of Radiologic Technologists to make an on-site visit of the school that is applying for approval. Accreditation is not based on paper evaluations.

One of the speakers this morning mentioned that the standards were not being adhere to in some instances. I couldn't agree more with him because, after all, we are dealing with human beings, but we do our very best. We depend upon the radiologists and the technologists to carry out the on-site visit for us.

This done, they send a report to the Committee on Technician Training of ACR. On this Committee, there are radiologists and X-ray technologists. This committee reviews the material and then recommends to the Council on Medical Education the action to be taken regarding the particular school. The Council then reviews all the data and takes final action. It may agree with the recommendation of the committee, or it may not. If the latter should happen, a joint conference would be called for a review of the program.

This, then, is the way our approval program is conducted. (We are trying to use the term "approval" for those programs that are at less than the baccalaureate level and the term "accredited" for those programs that are at the baccalaureate level. This is upon the recommendation of the National Commission on Accrediting.)

At regular intervals, the presently approved programs are reviewed again by on-site visits. This is usually done by a radiologist and an X-ray technologist after pre-survey material has again been submitted and the school is visited. Again, I am sure that in the five-year interval, there must be some schools that slip. To bolster such programs is the purpose of the ongoing surveys. This is not done as a form of police action; we are in it to continually improve education for the X-ray technologist.

A great deal has been said this morning about the need for advancement in the field for X-ray technicians or X-ray technologists. When we speak of advancement in a field, we must know where it is we hope to go. What is it that is needed? Do we need the various levels of personnel as was mentioned by Mr. Wilson a moment ago, or don't we? Some people say that we do, and they can make a good case for it. Some say no.

Another concern that is frequently expressed is the inability for advancement in the field, that if one wants to go up the educational ladder, he must begin all over again. This will be true so long as the X-ray technician training programs are hospital-based programs. It can be no other way. Hospitals are not educational institutions. They are health-care institutions. Training done in a hospital school is not acceptable toward meeting degree requirements of a college or university. There is significant new development, however, that warrants consideration and support. Community colleges are rapidly developing and have an expressed interest in the training of health technicians at all levels.

Youngsters who are in high school or even in grade school are being urged to continue on with their education beyond high school. Four-year colleges are just not here to accommodate such an influx of students. Neither can the four-year colleges accept the educational challenge of those who are beyond high school age for additional education--those in their 40's, 50's, and even the 60-year-olds. The community college is filling this gap, and is looking for curricula that relate to the training of health technicians in all areas. X-ray technology happens to be one of them.

It behooves us to cooperate with this movement, not in lowering standards but in working with community colleges in developing programs that will attract youngsters. This can be done and done well without changing our standards.

If we don't work with the community colleges, the programs will be developed without our guidance. The colleges are being pressured by the community, by the physicians, by the X-ray technologists, and by the fact that funds are available to support this kind of a curriculum. As I said at the outset, health is popular at the present time, and training funds are available. We must work with the community colleges, then, in developing reasonable programs. If we do this, the youngster who has entered the community college program does have a leg to stand on if he wants to go up this educational ladder that we keep hearing so very much about. He has an academic record that is acceptable, at least in part, if he wants to go on for a baccalaureate degree.

Now, please don't misunderstand me. What I am saying is that we need to give strength and support to the hospital-based programs that I predict will continue to furnish the great majority of X-ray technicians. At the same time, we need to raise our sights and look at the opportunities that we have in other areas, namely the community college.

The Council on Medical Education and the Department of Allied Health Professions and Services will continue to serve X-ray technologists, the American College of Radiologists and the federal programs as we have in the past. Things are pretty darn good in this country, in spite of the crepe-hanging that goes on. We have good technicians, we have good radiologists, we have good training programs. We are performing a service for the people. We are regulating and developing and supporting our training programs. The only thing is we just need to do a little bit more.

Thank you.

DR. CHADWICK: Thank you very much, Dr. Taylor. Perhaps this dissatisfaction and crepe-hanging is just a characteristic of man, the restless dissatisfaction with the status quo and desire to improve things.

Well, we now move to another aspect of raising standards and from some of the comments that have been made this morning, I gather a somewhat controversial one. That is the New York State program of licensure of X-ray radiologic technologists.

We have three persons from New York State to discuss this program. And the first of these is Dr. Granville Larimore who is the First Deputy Commissioner of the New York State Department of Health.

NEW YORK STATE'S X-RAY TECHNOLOGY PROGRAM

DR. GRANVILLE W. LARIMORE: Thank you very much, Dr. Chadwick. It is a very great pleasure and a real privilege for three of us from New York State to be here this morning and to tell you a little of our experience in New York State with the relatively new licensure program which we know is controversial in some quarters.

I wish time did permit us or me, particularly, since I lived through this with the State Department of Health, to tell you something of the fascinating story of the accomplishment of licensure of X-ray technicians in New York. You may think this was easy to do, but I assure you it wasn't. It took many years of activity on the part of the X-ray technician groups and, frankly, on the part of our department because we became convinced that this was the answer to the problem we faced in New York with unqualified operators exposing our people to increasingly sophisticated X-ray procedures.

The fact that licensure was achieved, I think, was due in considerable measure to the devotion of Mr. Goldman who became quite an expert "lobbyist" over the several years this was going on and to the full support of Dr. Roach on behalf of New York State's radiologists.

Now, to tell you a little something about our experience. As I am sure I don't need to relate to this group, X-radiation, while its benefits are immeasurable, it is a hazardous agent both medically and technically. And because of its hazard, it merits, we as a health agency feel, the same total control due dangerous drugs.

Good radiographic technique calls for the proper use of equipment in relation to the desired medical objective. After a medical decision has been made that X-ray is essential for the patient's health, the combination of equipment design and technique will, of course, determine the relative risk.

When proper standards for good X-ray equipment design have been obtained, the next important step toward reducing unnecessary exposure lies in further improving techniques. Here we must recognize the key role played by the qualified X-ray technician. If proper collimation, filtration, fast films, high kVp, et cetera, are utilized, if optimum aiming of the X-ray beam is obtained and unnecessary retakes are reduced to a minimum, the X-ray technician can easily reduce exposure of patients to radiation by a factor of 50 to 75 percent over what it might otherwise be.

Further, if proper technique is important in determining the total radiation exposure a patient receives, it is probably even more crucial when we consider the unnecessary exposure of the gonads to radiation. Because of poor tube angulation, improper selection of field size, incorrect centering of the beam, or failure to use gonadal shielding, unskilled operators often can expose the gonads of patients, as I am sure you are aware, to as much as 100 to 200 times the amount of radiation necessary from a purely medical point of view. Even in taking a simple wrist X-ray, the beam can often be directed, entirely unnecessarily, toward the gonadal region.

In New York, the program for inspecting X-ray installations for safety, which we started back in 1957, confirmed for us what has also been found in many other studies. In a distressingly high proportion of medical exposures, patients were receiving a higher radiation dose than was absolutely necessary for the particular purpose of the exposure.

Moreover, parts of the body outside the area of clinical interest were receiving substantial radiation doses. Inspectors often found operators who were unfamiliar with such simple beam-limiting devices as cones or collimators, additional aluminum filtration of the useful beam, and local shielding of the patient's gonads. These were frequently used incorrectly or not at all.

The fact that there were State regulations in effect requiring the presence of such devices and equipment modifications in X-ray installations had limited value. Their actual correct use at times when the State or local health inspectors were not present could not be depended upon if the operators did not have sufficient training to be aware of their importance in providing protection.

It is, of course, possible to teach any reasonably intelligent individual, in a comparatively short period of time, how to push the buttons of an X-ray machine so that photographically satisfactory pictures may be turned out. However, it is not possible to teach the essential safeguards in any such brief period of a few days, weeks, or even months.

To do this, the technician must first be adequately taught the physics of X-ray production, the principles of radiographic exposure, and both the immediate and latent physiological effects of radiation. He must understand the need for, and be thoroughly trained in, the proper use of all protective measures and devices aimed at ensuring the safety of the patients entrusted to him, as well as his own safety.

When New York began to license X-ray technicians in 1964, there were an estimated 12-14,000 people in the State other than physicians and other practitioners of the healing arts, using medical X-rays on human beings. What qualifications had they to do this?

Until that time there had been nothing to prevent anyone, without even an hour's instruction, someone just walking in off the street, for example, from operating X-ray equipment and through ignorance or misuse doing serious damage not only to the individual exposed, but, through the genetic effects of radiation, to unborn generations to come.

We are sure that if you asked the average layman in New York State, or anywhere else in the United States, whether he thought that the people who X-rayed him should be licensed as qualified to do this type of work, he would look at you in bewilderment. "Aren't they already licensed?", he would ask. He knows that the barber who cuts his hair is licensed and it would be inconceivable to him that anyone in whose hands is placed such responsibility for his health and welfare should have no legal controls over his competence. Yet that was the situation prevailing.

Of these 12-14,000 people who regularly exposed their fellow human beings to radiation in New York State, only about 2,000, who generally worked for private radiologists or in the radiology departments of better hospitals, had subjected themselves to any objective review of their competence. These were the X-ray technicians certified by the American Registry of Radiologic Technologists.

As you know, this is a voluntary national accrediting agency, jointly sponsored by the American College of Radiology and the American Society of Radiologic Technologists, which requires for accreditation, at the present time, completion of a two-year approved course and the passing of a written examination.

Assuming all of these people to be competent--and this, we would point out, was not necessarily so, since many had obtained their certificates years before under qualifications and examinations which were much less stringent than those of today--this still left a minimum of 10,000 people taking X-rays without any controls or standards whatsoever.

From our experience with the inspection program for X-ray installations, we knew that a large number of these other people taking X-rays were not really X-ray technicians. They were nurses, secretaries, receptionists, medical assistants, and others working in the offices of private physicians, other than radiologists, where about 85 percent of the X-ray units not in hospitals in our State were located. For the most part, their "training" was limited to a few hours of instruction by a representative of the equipment manufacturer. Some had also learned something about X-ray by taking a commercial school course for a few months, generally the course given for medical assistants.

This brings us to a more general consideration of the usual background of training and experience for people who are generally referred to as "X-ray technicians."

If we can accept as typical the findings of a recent questionnaire survey made by the Public Health Service covering eight States and the District of Columbia, over one-half of practicing X-ray technicians are *not* certified with the American Registry. In New York, at least, we know that this proportion is really *much* higher. The survey also found that only about one-half of *all* X-ray technicians, and only one-tenth of all non-Registry technicians, had *any* formal training in X-ray technology.

From our own recent experience in reviewing applications for licenses, we can say that even to state that a technician has had some formal training is often not really saying much, since even formally trained X-ray technicians often have a woefully inadequate education by accepted standards for most other fields.

In New York State, and particularly in New York City, among the largest purveyors of formal training in X-ray technology, until recently, have been the commercial schools. These schools generally appeared to have little in the way of entrance standards other than ability to pay tuition and fees.

Furthermore, they had no clinical affiliations with hospitals or other medical institutions to enable their students to get practical experience. And a few years ago we were shocked to find their method of giving students experience was to have them take X-rays of one another.

The reputation of their graduates among radiologists and other hiring officials was extremely poor. Many radiologists expressed their preference for hiring people off the street and training them "from scratch" rather than taking these graduates, whom they felt had acquired much misinformation which would have to be unlearned. For this reason, commercial school graduates who could find employment often had to work for about a year as hospital volunteers before receiving any pay. In this respect they were no better off than other completely untrained people who often began their careers as X-ray technicians in this way.

In fact, working as an unpaid volunteer was the traditional way for young people to break into the field of X-ray technology until not very long ago. Or, looking at the coin from the other side, the traditional way in which hospitals and radiologists would satisfy their needs for new technicians was to pick up some promising young boys and girls who perhaps could not afford to, or did not want to, stay in school and take them on as "apprentices." The pay, if any, would be very low.

If it were in a hospital, they might aspire, in time, to a title of hospital attendant or hospital helper. Eventually, but never knowing exactly when, they would find themselves with enough experience to be considered full-fledged X-ray technicians. Nevertheless, throughout their careers, both their pay and their prestige reflected this on-the-job training character of their beginnings.

Many of today's hospital schools started in the way we just described, as informal on-the-job training programs. The quality of the training offered at some of these schools today still reflects this origin. Some lack formalized course planning and have very little in the way of course outlines and lesson plans. Classes often are not regularly scheduled or are readily postponed because of the demands of the X-ray department's workload.

The teaching and clinical experience are often given as if in two separate worlds with no attempt to integrate one with the other.

The keeping of adequate records, testing, student assignments, and other matters one would expect to find in a well-run school are often missing or rudimentary.

Undoubtedly, too many of the X-ray technicians responsible for running the schools have education training and lack the aptitude to organize and teach. The radiologists in some of these schools, who are nominally the school directors, generally know very little about what is taking place in the schools for the simple reason that they are busy reading X-rays and supervising department operations and therefore cannot give the schools as much time as I am sure they would like.

What we have just described are the typical "middle-run" group of hospital schools in our State. Among our schools, there are, of course, some which are doing a much better job. This is generally because the radiologists have selected X-ray technicians to manage the schools who have a great deal of drive and dedication and have taken the trouble to equip themselves for this work.

But below this middle-run are quite a few other hospital schools which started as on-the-job training programs and have made little or no progress beyond that point. Some schools have made exploitive attempts to reduce the operating costs of X-ray departments by using unpaid or low-paid students in place of trained or experienced technicians. Or the tuition received from the students was given directly to the teaching technicians as a "bonus" offsetting the relatively low pay they received from the hospital.

When licensing went into effect in New York, some of these schools which we visited did not even attempt to qualify for State approval, but informed us that they did not really have a school or were planning shortly to cease operations. Others are now working to develop their training programs into real schools.

New York is a larger State than most others and perhaps some of its problems are larger, too. Nevertheless, we do not believe that the generally poor picture of X-ray technician training in our State, which we have just described, is unique to us. Nor do we believe that we are the only State in which many of the people applying radiation to human beings had inadequate qualifications to do this and were neither well-trained X-ray technicians nor licensed practitioners of the healing arts.

Ask any chief X-ray technician about the training of many new technicians he has had to break in. Ask any radiologist about the quality of many of the radiographs brought to him for consultation by attending physicians, radiographs taken by their nurses or medical assistants.

The only way in which New York State apparently is unique is that we are the only State which so far has made any attempt to do something about this problem through a licensure program.

The discussion topic for this afternoon's group session is: "What will it take to provide adequate numbers of appropriately qualified operators of X-ray equipment in medicine?" Dr. Roach and Mr. Goldman will shortly give New York State's views on this matter. But before they do, we would like to raise another very basic question that should also be explored.

It will also be explored this afternoon. This question is: "How can we prevent unqualified operators of X-ray equipment from applying X-rays to human beings?"

It may be pointless for this conference to determine the needs for X-ray technicians in numbers and qualifications if it does not also come to grips with the more immediate problem of preventing the employment of unqualified operators of X-ray equipment. They are presently among the principal dispensers of unnecessary radiation in the United States. Since many physicians and hospital administrators can and do hire unqualified people to take radiographs for them, we believe it is more important, from a public health viewpoint, to set bare minimum standards for all X-ray technicians and enforce them, than to raise the standards of the better X-ray technicians and just hope that hiring officials adhere to them.

The present system, prevalent in most States, whereby a code exists setting standards of safety for X-ray equipment, but not the operators applying the X-rays, is akin to registering and inspecting motor vehicles without requiring the operators to demonstrate their ability to drive.

In short, without any reflection whatever on the efforts that have come before, our experience in New York State as a health agency indicates rather clearly that on-balance licensure is beneficial and that if we may be allowed to do so, we would predict that in the years ahead other States will adopt licensure programs similar to that in New York State. We believe that licensure of X-ray technicians is necessary from the standpoint of protecting the population against one source of unnecessary radiation they received at the hands of unqualified operators. Furthermore, experience with other groups in the allied health professions, dictates that such licensure is virtually inevitable. We urge all in this field to join in making sure that licensure programs which lie just ahead will be sound programs which will maintain high standards, protect the public, and attract competent young people to X-ray technology.

DR. CHADWICK: Thank you, Larry. We are running a little short on time, so I won't comment any further. Dr. John Roach, our next speaker, is Chairman of the Board of Licensure in New York State--Board of Licensure for X-ray Technicians. Dr. Roach.

DR. JOHN ROACH: Dr. Chadwick, ladies and gentlemen of the Conference: When the situation just described by Dr. Larimore was fully recognized, the State Health Department presented its facts to the New York State Society of X-ray Technicians which, at the Department's urging, prepared a model X-ray technician licensing law. Because X-ray technology was not then a discipline requiring a college degree, the State Education Department was reluctant to sponsor such a bill. The State Health Department, with the approval of the State Education Department, therefore, picked up sponsorship of a licensing law as part of its responsibility for the control of ionizing radiation.

Bills to license X-ray technicians were submitted to the Legislature with the endorsement of the State Radiological Society, State Society of X-ray Technicians, and other interested groups, in each year from 1960 through 1964. The final bill, revised from experience gained in earlier years, became law as Chapter 295 of the Laws of 1964, effective on July 1, 1964.

This law requires that, after October 1, 1965, except for physicians and other licensed professional practitioners, only persons holding a State license could apply X-rays to human beings. Furthermore, licensed X-ray technicians can only apply X-rays while under the supervision of a professional practitioner, and then only to those persons or parts of the human body specified in the law under which the professional practitioner is licensed.

Special provision was made in the law for the examination and licensing of existing practicing technicians. This, unlike the customary grandfather clause, did require existing technicians to demonstrate levels of capability through written and oral examinations.

Standards are set for the licensing of future technicians based upon satisfactory completion of a two-year course of study approved by the State Health Department or State Education Department. The law specifies a minimum content of classroom work and clinical experience to be met by approved schools. Applicants are also required to meet the usual standards of age, moral character, and preliminary education at least of high school level. A provision for accepting Registry certificates in lieu of examination was also included in the law.

In order to advise the Department in its administration of the licensing program, the law established an X-ray Technician Board of Examiners composed of two radiologists, two experienced X-ray technicians, a health physicist, a hospital administrator and a general practitioner of medicine.

During the two years the licensing law has been in effect, the State Health Department has licensed about 6,800 individuals. Of these, approximately 2,500 were licensed on the basis of their certification by the American Registry of Radiologic Technologists. Of the 4,000 licensed on the basis of examinations under the law, 2,000 were present practitioners with over five years of experience. These were given practical examinations. Another 1,000 with over one year of experience, but less than five years, were given special written and oral examinations. Finally, about 1,000 have now taken the regular written examinations after completing an approved course in X-ray technology.

For the practical and oral examinations given to the grandfathers, over 100 highly-trained, usually chief technicians, were recruited throughout the State to examine at some 35 hospitals.

Two points about the "present practitioner" examinations that I would like to emphasize. First, the examinations were intended to be of a qualifying nature only since the Health Department knew it could not sharply cut into the supply of practicing technicians without injuring medical practice. The examinations, therefore, disqualified only those manifestly unfit to practice. This was especially true in the practical examinations given to people with over five years of experience. The second point about the "present practitioner" examination is that throughout the process of conducting these examinations, the Department consulted closely with its X-ray Technician Board of Examiners. A radiologist, member of the board, and an X-ray technician on the board personally re-examined all candidates who initially failed the practical examination.

Since the termination of the grandfather provision on July 1, 1966, all applicants, including those holding certificates from the American Registry, must have some formal schooling. After October 1, 1966, they must be graduates of a two-year approved school registered with New York State.

Since only about 6,800 technicians have been licensed, the logical question is: "What happened to the other thousands of people, as Dr. Larimore told you? What happened to them?

It appears that most of these--nurses, receptionists, and so on--eliminated themselves by not applying. Apparently they felt with their limited experience and no formal training, they did not wish to risk examination.

The "present practitioner" examination, therefore, served a purpose not originally intended or obvious: the examinations discouraged many clerks, typists, and receptionists from applying for a license and thus removed these individuals from the field. Removal of these people should be beneficial to the general public as well as to the professional status of the X-ray technician.

Almost all applicants with substantial experience qualified on the "present practitioner" examination and were licensed. For this reason, the larger number of X-ray installations in New York State experienced a smooth transition on October 1, the date on which the licensing law became effective.

The State Health Department, with the advice of the Board is now engaged in a continuing effort to maintain high professional standards in the training of X-ray technicians in New York State. Changes in the original law, such as amendments which provided for special licenses for X-ray therapy technicians and chest radiographers and the amendment put through this year permitting the Department to grant temporary permits to new applicants for licenses, were made only after the Board and the Department gave very careful consideration to them.

There is a very deliberate determination on the part of both the Board and the Health Department to see that nothing is done to water down or fragment this licensing law. With this in mind, the Board and the Department have considered and rejected several other proposed changes which they did not consider in the public interest.

The heart of the New York State Licensing Law is found in the requirement that applicants for a license must henceforth have, and I quote:

> "... satisfactorily completed a twenty-four months' course of study in X-ray technology in a school of X-ray technology registered by the State Department of Health or licensed by the State Department of Education as maintaining a satisfactory standard, or the equivalent of such a course of study, as determined by the department or the equivalent of such a course of study in a college as determined by the State Department of

> Education. The course of study shall include not less than three hundred twenty hours of classroom work including the following subjects: X-ray physics, radiographic techniques, darkroom chemistry and techniques, anatomy and physiology, radiation protection, radiation therapy, and ethics; and shall include not less than twenty-four hundred hours to be devoted to clinical experience consisting of demonstrations, discussions, seminars and supervised practice, including not less than eighty hours of regularly scheduled supervised film critiques."

The above provisions, we feel, are extremely important. They assure us that in New York State, X-ray technicians cannot be trained in makeshift or apprentice programs which turn out second-rate people. These debase the entire field of X-ray technology while making no real contribution towards meeting the need for more better-trained technicians.

A problem of scarcity does exist in the field. Some have proposed abbreviated courses as one solution to this problem. In New York State where we have had experience with this particularly from the commercial schools, we do not consider this answer the least bit adequate. The high standards contained in our licensing law will not permit the introduction of this sort of a solution in New York State.

In summary, then, the pioneer legislation mandating licensure of X-ray technicians which became effective in July, 1964, sets high standards for eligibility for licensure for present and future practitioners. It established a nonpartisan advisory board consisting of experienced individuals, each of whom is capable of bringing to the Department the advantages and advice of his particular specialty. It is believed that such a board can help the Department maintain reasonable standards for the safeguarding of the public from untrained individuals.

And, finally, as the next speaker will explain in some detail, it has encouraged the development of new community college, hospital-based X-ray technology schools which will lead to the development of a Statewide system of associate degree courses. Thank you.

DR. CHADWICK: Thank you very much, Dr. Roach. Our final speaker in this discussion of the morning program is, I guess, the grandfather of the program, Mr. Howard Goldman.

MR. HOWARD L. GOLDMAN: Thank you, Dr. Chadwick. Ladies and gentlemen of the Conference: I would like to speak a little on the phase of training we envision for new technicians under this licensing program. Regarding this afternoon's main topic, "What will it take to provide adequate numbers of appropriately qualified operators of X-ray equipment in medicine?", it seems apparent to us, particularly after listening to Drs. Scudder and McMartin this morning, that the problem of the supply or quantity of X-ray technicians cannot be divorced from the problem of quality. So long as well-trained X-ray technicians are produced in such small quantities as they now are, the bugaboo of scarcity will continue to exist and will impede efforts to legally mandate minimum quality standards, as recommended in the recent report of the National Advisory Committee on Radiation.

In line with Dr. Morgan's statements this morning, it scarcely needs saying that recent Federally-supported programs in the medical care area have expanded the manpower needs in all paramedical disciplines, including X-ray technology. Then, too, the general population growth requires more X-ray technicians. Added to this, however, is an ever-increasing use of X-ray in medical practice, along with an increase in the complexity and power of modern X-ray equipment. The development of more sophisticated procedures in coming years, with more intricate and potentially hazardous techniques, can be expected. The growth in the use of radioactive isotopes in therapy and diagnosis is another factor which also must be considered.

Putting all of this together, we can see that there is an urgent necessity to get more and better-trained people into the field of X-ray technology.

One of the main activities of the New York State licensing program, therefore, is

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to promote the creation of new training facilities and upgrade the existing ones. At present, there are about sixty hospital schools training X-ray technicians throughout our State, each training an average of five to eight student technicians. This is on an average. Some train two and some may train as many as 25. This is a considerable increase from about thirty schools operating in the State in 1964 when licensing went into effect. We consider the hospital schools to have an important role to play in meeting some of the need and we intend to continue our efforts to promote these schools, particularly in rural areas.

Nevertheless, it is apparent to us in New York State that hospital school training alone cannot hope to meet the total need in coming years. This is partly because of the low volume of students each school can train. But, even more important, these schools are having more and more difficulty attracting better students in competition with other careers where formal academic training in community colleges and technical institutes offers the student greater prestige and higher earning power than he can hope to attain in X-ray technology, as well as opportunities for continued training at higher academic levels. And this is also in line with Dr. Taylor's statement of this morning.

This situation is also partly responsible for the present overwhelming preponderance of women in the field of X-ray technology. This has, in turn, resulted in an unusually high rate of attrition, job instability, and low salaries, which have aggravated the chronic shortage of qualified X-ray technicians.

To meet this challenge, the New York State Health Department is now working with the State Education Department and State University to promote community college courses offering two-year associate degrees in X-ray technology. The basic curriculum for these college courses has been planned with the assistance of the Community College Health Careers Project, a special project under the auspices of the State Education Department operating under a grant from the Kellogg Foundation.

A study group was formed under the Health Careers Project composed of radiologists and X-ray technicians, who have achieved distinction in the field of radiology, and also community college educators responsible for curriculum development. Material was prepared which enabled this study group to determine what the graduate X-ray technician should be able to do to properly accomplish his duties. From this determination, the study group designed a program to prepare safe beginning practitioners of X-ray technology.

I repeat, "safe beginning practitioners of X-ray technology."

The courses of study were arranged and developed so that the colleges could be expected to graduate a person experienced and reliable in all routine X-ray procedures conducted in either a private office or a 1,000-bed hospital. This foundation is expected to allow the technician, after additional years of experience, to be capable of becoming a supervisor, a chief technician, and a teaching technician.

The first experimental pilot course began at Broome Technical Community College in Binghamton in September 1965 and is now in the second year. A second pilot course is now underway at Hudson Valley Community College in Troy. Groundwork is being prepared for several others to start in September 1967, including at least two in the New York City area--one at the Bronx Community College and another at the New York City Community College and Technical Institute. The development of these courses is being followed closely by both us and the staff of the Health Careers Project. It should provide important feed-back information for the benefit of other schools.

The long-range goal of the community college program is to develop a network of 15 to 20 community college courses strategically located throughout the State where students can be trained in relatively large numbers, perhaps 30 to 40 to a class. Programs would lead to an associate degree.

A similar medical school-based course is also in operation at the Upstate Medical Center in Syracuse. At least one more course of this type is expected to develop in the New York City area. A limited number of baccalaureate degree courses to train technicians to fill administrative and teaching positions is also contemplated. The two colleges presently planning such a four-year course are C. W. Post and St. John's College, both on Long Island.

Each of the community colleges, of course, has several hospitals affiliated with it where students obtain practical experience. But the most unique feature of these New York State courses is that students get part of their clinical practice at the college itself. Special X-ray laboratories are being established directly on the campus for this purpose. The Health Careers Project has prepared a cost estimate for this type of laboratory. Incidentally, we have two such laboratories in operation now.

Aside from protective lead shielding, equipment, and the usual accessories for an X-ray room of ample size to accommodate at least 15 students at a time, the laboratories also provide a plastic impregnated phantom to simulate a patient. The students at first are trained on this phantom so that when they later go into the X-ray departments of affiliated hospitals, they know what they are doing and are able to handle patients with some degree of competence.

A prime hope and expectation in the development of community college courses is that they will have a beneficial effect by bringing X-ray technicians into the field who have a broad enough background in subjects such as biology and physics to appreciate and share the public health concern for reducing unnecessary exposure to radiation. These courses attempt to give the students a liberal academic background with English, psychology and mathematics in the curriculum as well as stronger doses of biology and physics than they might expect to get at a hospital school.

To compensate for this greater amount of time devoted to academic work, their applied clinical experience is made more pointed and structured with important preliminary parts of it taking place in the school laboratory on the campus, using the phantom and other teaching aids. In this way, the students spend less time repeating common procedures which they have already mastered. The affiliated hospitals also are assured their patients will not be placed in the hands of inadequately prepared students.

We in New York State are very enthused about the prospects of this type of community college training. However, we would not want to leave the impression that we are not facing problems.

For one thing, this is a unique type of program in the field of X-ray technology training. There are several places in the United States where colleges or other schools give students six to nine months--some give two years--of intensive classroom work and then send them to an affiliated hospital to work for a year or so before being awarded a degree or a diploma. And many times, during this year, the college has no contact with the student at all.

This is not what our community college course is intended to be. A keystone of the community college course being developed in New York is the determined effort to closely integrate classroom teaching and hospital experience. To achieve this, total responsibility for the management of the entire course is placed in one institution. This is the college.

Within the college itself, responsibility for course planning and coordination resides with a Program Director who is a teaching technician and, ideally, has a strong background both in the practice of X-ray technology and in education.

I say "ideally" because, as some of you may know, such people at present are not readily available. For this reason, the State Education Department and the Health Department are trying to fill the gap by finding experienced technicians with some teaching background and giving them training seminars in educational methods.

The first such seminar for about twenty promising technicians was held in Syracuse this summer with the aid of Federal training funds. It is expected that additional seminars will be held in the future.

Since most technicians attending these seminars are involved in hospital school training, the seminars should benefit even those who do not eventually end up in a community college. The Community College Health Careers Project is also trying to set up a center at the City University of New York to train X-ray technology teachers for community colleges. I understand they are starting this September.

A final problem which our community college program is facing, a problem which faces all innovations, incidentally, is that of obtaining acceptance. In order for the idea of training X-ray technicians in community colleges to be given a fair test, it must have the open-minded cooperation of all involved people and groups in the community.

For instance, if influential radiologists or X-ray technicians choose to look only backwards and instinctively oppose any variation from the present system of hospital school training, a college course may not be developed in that community: the required clinical facilities will probably not be made available by these same radiologists and technicians. But it will not be the college that will be hurt. Colleges are besieged by many interested groups for various types of training. They can easily go into another field where community support is stronger. It is the radiological services which can be hurt through the resulting insufficient supply of adequately trained X-ray technicians.

We would now like to summarize New York State licensing program views in the following two ideas on the training of X-ray technicians:

First, it is futile to seek to put the roof on the training edifice if there is not a secure base or foundation. It is not enough to bring in the competent. We must also have a tool for keeping out the incompetent.

The only effective tool for doing this is minimum legal standards through State licensing. Voluntary systems are patently unworkable since there is nothing to prevent physicians or hospital administrators from hiring unqualified people or training their own technicians on the job. This is especially so under pressures created by scarcity and the desire to hold down costs. It is a fact that the one existing and most generally accepted voluntary system of certification, the American Registry, is now ignored by at least one-half of the people involved in the medical use of X-rays. This applies to both operators and their employers.

Second, if we are to train X-ray technicians in sufficient numbers to meet future needs, we must be willing to experiment with new methods. The prevailing system of training X-ray technicians in small numbers only in hospital schools is not adequate. It cannot, furthermore, attract enough young people of a high enough caliber into this field.

X-ray technology requires two years of stringent training for its competent performance. If it is to successfully compete with other vocations for the interest of the same able young men and women, it must move at least a part of its training into the academic environment in which most of the higher skills in our society are taught today.

In brief, we hold the opinion in New York State that the two foundation stones upon which standards of X-ray technicians must be built are:

One, legal enforcible standards of minimum training for all new people coming into this field;

And, two, promotion of training, including community college training of a caliber consistent both with the skill which a competent X-ray technician must acquire and with the aspirations of young people we want to attract into this field.

Incidentally, copies of these talks on the program of New York State's licensing program are available outside if you do want them.

CONFERENCE CHALLENGE

DR. CHADWICK: Thank you very much, Mr. Goldman. I would like to close the morning's session. We should finish up in a few minutes. I would like to give you a little information about this afternoon's session since we will be in separate groups.

I think the challenge has already been very effectively given by the speakers this morning, so it would not be useful for me to go into any detail. The previous speakers have indicated the question we are addressing ourselves to in this conference: What will it take to provide adequate numbers of appropriately qualified operators of X-ray equipment in medicine? And the "what will it take" is the whole gamut of training, proper support, proper recognition, status, money, all of these things that have been alluded to this morning.

So let me just list some of the questions we would like the discussion groups this afternoon to consider and hopefully help answer:

First of all, how many qualified technicians are needed? We realize this is a very difficult thing to answer. But how many qualified technicians are really needed at the present time? And how many will be needed in the years ahead?

What should the technicians be able to do?

What should the job descriptions be of an X-ray technician or radiologic technologist?

Are there supporting roles to the radiologic technologists such as darkroom technicians, record clerks, that should be a part of the hierarchy?

Should there be different qualifications of operators? In other words, should there be different classes of operators of X-ray equipment? This is a question that is very, very important now.

What are the qualifications that should be required of radiologic technologists or X-ray technicians, the prerequisites, the training that they should receive, the academic or didactic training?

What background experience should they have for their proper work?

How should this training be accomplished?

We have heard the various kinds of schools that need to be considered at the present time--the hospital-based schools, the community colleges and so on. How can these be most effectively brought into maximum productivity?

What kind of help can existing Government programs give this education?

What resources do the schools need to do an effective job?

Full-time teachers, rather than teachers who are occupied in other positions and have little time to spend on training.

Training materials and aids that can be used as we mentioned earlier, like phantoms instead of the extremely undesirable practice of students X-raying each other.

Facilities for carrying on the training.

And, finally, the undergirding of the whole thing, the matter of funds and support of students in the training.

What about the requirements for continuing education? Obviously, there are many technicians presently working who need to have their background strengthened. And there are new developments all the time. How can this be most effectively carried on among radiologic technologists, large numbers of whom are scattered widely among physicians' offices?

And then, in the same vein as the question that Mr. Goldman, I think, very effectively brought forward, how can we prevent the unqualified, the manifestly unqualified, operators from unnecessarily exposing the public?

The final question and the one that has been mentioned by a number of speakers, how are we going to attract and retain well-qualified people?

I think some of these things are obvious. But we need to dig a little more and offer suggestions on salaries and similar matters. How can the status of the technicians be improved so we can attract more well-qualified people?

Now, for the sessions this afternoon, you will notice from your programs that there are four groups. We have tried to set these groups up on a more or less random basis, but with a spectrum of the different disciplines represented at the conference today.

This is the close of the morning session.
(Whereupon, at 12:30 o'clock p.m., the meeting adjourned.)

Second General Session

SUGGESTED DISCUSSION QUESTIONS, LISTED IN PRE-CONFERENCE LETTER

1. What should X-ray technicians be able to do? Are there supporting jobs? How do they relate to others? Who do they report to?
2. What qualifications are needed to be employed as an X-ray technician?
3. How do you prevent unqualified X-ray technicians from operating X-ray equipment in medicine?
4. How many qualified X-ray technicians are needed--in terms of total numbers, per hospital, per number of examinations, etc., now and in ten years?
5. How can training be accomplished to meet the manpower objectives--i.e.: Present AMA approved schools; educational institutions; assistance of governmental and other groups, etc.?
6. What resources are needed?
7. What about requirements for continuing education?
8. What will it take to attract and retain qualified X-ray technicians--working conditions; salaries; professional development; future opportunity, etc.?

WORK GROUP REPORTS

DR. CHADWICK: If the discussion groups in which the rest of you participated were as lively as the one I was able to join, some of the heat and light has been emitted during the sessions yesterday afternoon and this morning that was built up during the session yesterday morning. At least I hope so.

What we would like to do at this session is hear from each of the groups. Then we would like to discuss these reports with a view to finding a consensus on what we think the sessions in the last day and a half have provided.

It might be a good idea to have all the moderator reports given before we have any discussion. There may well be different points made in the different reports that occur to us as we are listening to the report. So perhaps it would make our discussion more profitable if we heard all of the reports before we engaged in discussion.

Just in case I forget later, we will not attempt at the comment session to carefully identify the speakers. I think it will just be too complicated in a group this size.

With this by way of preliminary, then, let's move on and hope that the reports of the moderators will not last more than about fifteen minutes each. That would give us time for a good discussion period.

Well, then, Work Group I was moderated by Dr. Reynold Brown. Dr. Brown, are you ready to give your report?

Group I

DR. REYNOLD F. BROWN: Thank you, Mr. Chairman. First I want to thank our assistant moderator, Mr. Goldman, our recorders, our audience and participants. It has never been my pleasure to spend such an enjoyable period of time with such a courteous group as has been my pleasure these two days.

We bring you a group of 12 resolutions or recommendations. We have not examined them in great detail for the meaning of each specific word. And we would hope that you would not do so. We would ask you to examine them only in their general thought and content. This is in the nature of a report which is going to the Public Health Service for review.

As I list each recommendation, I will try to give you some of the sidelights that result in these recommendations. But, for the same purposes that Dr. Chadwick mentioned, I will without remark read the entire list.

1. Group I endorses the inclusion of didactic and academic programs to complement and improve the training of X-ray technologists.

2. Group I endorses the use of two-year associate degree colleges in conjunction with hospitals to provide X-ray technologists training programs.

3. Group I recommends the Public Health Service financially support these schools of X-ray technology that are in fact as well as name truly educational institutions.

The criteria suggested for such evaluation include: Adequate physical facilities devoted to education. A staff with a principal competency and responsibility to educate. Adequate study and library facilities.

4. Group I recommends financial support of: faculty positions, scholarships, physical facilities, and educational equipment in schools which are in reasonable compliance with the requirements of number three.

5. Group I recommends the support of a continuum of educational and career opportunities from the two-year associate in applied science degree to the doctorate and from technologist to the professorial and administrative management positions.

6. Group I recommends the Public Health Service exert leadership in raising the financial income of X-ray technologists. One avenue of such leadership is to upgrade the U.S. Government standards and salary scales for X-ray technologists.

7. Group I recommends the Public Health Service compile and circulate the unique elements of successful training programs.

8. Group I believes it is not in the public interest to sponsor or support technician training programs or technician categories inferior in education or experience to the present standards for X-ray technologists--namely, two-year programs in schools of X-ray technology.

9. Group I recommends the Public Service conduct a study of X-ray technologist licensure and make such information available to the organizations concerned as well as the general public.

10. (See page 51.)

11. Group I recommends that the U.S. Public Health Service develop another conference within two years of which the agenda items should include: The recent developments in X-ray technology. A review of teaching methods and materials. Presentation and discussion of teaching methods by a person of that discipline.

12. Group I commends and thanks the Public Health Service for the excellence of this meeting.

You can see that these resolutions by their nature were not arrived at quickly or without considerable discussion. They are meant to be rather general in their nature and their direction. And it is hoped they will be received in the same spirit in which they are presented.

Those in reference to education are not meant to depreciate any of the programs now in existence.

It is not meant that hospital-based programs without the associations mentioned here are not good programs. But since funds are limited and since from our discussion it appeared that here was the area of greatest interest and greatest potential, it was the consensus that support be directed in this area so it can be fully explored and evaluated. Then and only then would any kind of changes be advocated.

Nothing contained herein is intended to advocate change, but merely to direct the attention and support of the Public Health Service where we thought it might best be placed in accordance with the challenge and charge which was presented to our group.

Thank you.

DR. CHADWICK: Well, thank you, Dr. Brown, for a model of conciseness as well as completeness.

Proceeding to the other groups before we open the general matter for discussion, Group II was under the moderation of Mr. Richard Olden. Dick, are you prepared to give your report?

Group II

MR. OLDEN: Yes, Sir. Dr. Chadwick, fellow conferees: The following constitutes the report of Work Group II.

We answered the questions in the order received on the list. I will try to follow this sequence.

The first question we considered was: What should X-ray technicians be able to do? The consensus favored a recommendation that "technician" be defined as broadly as possible as a radiologic technologist in order to include several disciplines--namely, diagnostic roentgenology, radiation therapy and nuclear medicine. The proposed definition agreed upon is as follows:

A radiologic technologist is a member of the health team who applies ionizing radiation to humans on direction of a licensed physician for diagnostic and therapeutic purposes. In view of this definition, it is possible to classify the functions of the radiologic technologist in various ways--clinical service, training or research. Or, in another direction, as the basic technologist, the administrative technologist, the special procedure technologist, the teaching technologist, the science technologist and the radiologist's assistant.

Question two: What qualifications does a radiologic technologist need? After a brief discussion , the consensus indicated there were no mandatory qualifications at the present time except in New York State. As a result, the question was posed, "What qualifications should be stipulated for employment as a radiologic technologist?"

The first qualification noted referred to the age requirement. Attention was called to the inconsistency in the N.C.R.P. (National Committee on Radiation Protection) recommendations which may prevent bright young students under the age of 18 from entering a course of training in radiologic technology since such training involves a period of occupational hazard to a radiation environment. It was recommended that State regulations be made sufficiently flexible to occasionally enroll students under 18 years of age.

Other recommended qualifications included high school graduation or an equivalency certificate, graduation from a 24-month approved school, including clinical experience, good moral character and registration or licensure by an appropriate agency.

It was suggested that registration or licensure, in the New York manner, automatically incorporates these and other pertinent requirements.

It was noted without discussion that other qualifications have sometimes been established for those doing only chest or dental X-rays.

Third question: How many qualified radiologic technologists are needed in terms of total numbers for hospitals, et cetera, now and ten years hence? After a general discussion, it was apparent that no positive figures are currently available. A document which is appended to this report was submitted for the record from the Texas Society outlining the 1975 projected needs in radiologic technology in that State. Futhermore, a show of hands indicated that approximately two-thirds of those present in our group had existing vacancies.

In view of wide discrepancies in the estimates of manpower needs presented, we strongly suggest that a fact-finding commission be established to investigate this area. The mechanism for such a study could utilize the resources of the related professional societies. This project would probably require support from a Federal agency.

It was pointed out that the major problem may not be overall shortage in quantity, these may only be local or transient, but rather one of rapid turnover of personnel. Increasing the stability of the population and quality of training might be more important factors than increasing the overall numbers of new students entering the field.

Further, it was suggested that the turnover rates would be diminished with increased salaries. The summary of information from the group, a copy of which again is appended to this report, indicated an existing salary range from $310 to $650 per month for staff radiologic technologists. Also note that "supply and demand" appertains since it appears that where a surplus of technologists exists such as in Colorado, the salary scale is lower, whereas where there is a shortage of technologists as in Michigan, the salry scale is considerably higher.

When questioned as to the proposed starting salaries for staff radiologic technologists, recommendations were forthcoming ranging up to $6500 per annum. Strong comments were made against placing any ceiling on the desirable salary range.

Question four: How can training of radiologic technologists be strengthened and supported? Consideration was given to promoting further cooperation between hospital-based training and that given in academic environments. It was recommended that close liaison should exist between these institutions and hospital facilities so adequate clinical experience could be provided for students.

One of the advantages of an academic training program is that it provides a basic stepping stone for future career development and later specialization. Failure to provide this incentive for growth has been an obstacle in attracting good personnel into the field.

It would seem apropos, therefore, to give support to junior colleges and other academic institutions for the establishment and improvement of technologist training.

Along these lines, model programs should be developed in both hospital-based schools and colleges for radiologic technologists.

A third mode of assistance might be to provide short-term training in teaching techniques to radiologic technologists to help them become competent instructors.

Long-term fellowships should also be given practicing technologists to qualify them as faculty members of technological training programs.

Physical facilities for teaching are also needed and include libraries, technical teaching aids, classrooms and laboratories.

Question five: What about requirements for continuing education? Three areas of interest were discussed--subject matter, mechanisms of implementation, and how to reclaim inactive technologists.

In the area of subject matter, critiques from the ASRT-ACR institutes indicate a desire for further instruction on educational methods and materials, departmental administration and advanced instrumentation and techniques. To this can be added further emphasis on protection, equipment maintenance and automatic processors.

In refernce to the mechanisms of implementation, means of continuing education which are available or should be developed include institutes, programmed learning materials, correspondence courses, local adult education programs and journals.

To support this kind of effort, funds are needed for travel, honorariums, et cetera, and to solicit the cooperation of physicians in attending professional meetings and refresher courses with them.

How to reclaim the inactive technologist? In order to bring the inactive technologist back to part-time or full-time service, it was proposed that mailing lists of State societies be utilized. The teaching program listed above should be directed in part toward these people. Special courses designed to bring them up-to-date should be instrumental in retrieving some fraction of this valuable manpower resource.

The sixth question: How do you prevent unqualified radiologic technologists from operating X-ray equipment in medicine? There were differences of opinion expressed in the matter of licensure. Some felt the ultimate responsibility lies with the physician-employer. There was general agreement that the technolgist's education and qualifications in the use of ionizing radiation should be guaranteed. We agreed that uniform, nationwide minimum standards should be established. But there was dissention as to the mode of enforcement.

Thank you.

DR. CHADWICK: Thank you very much, Dick. Now, Group III was moderated by Dr. John Heslep from California. John.

Group III

DR. JOHN HESLEP: I should like to preface my remarks by giving my personal assessment, as a moderator, of the general format of the discussion groups. It is obvious, I believe, that 50-60 people are just too many, in general discussion, to arrive at definitive answers or recommendations. It did provide an excellent forum for a group of people from different disciplines and different parts of the country to exchange ideas. In this I think that our group was quite successful.

Group III addressed itself principally to two questions posed by this Conference. First, how can training be accomplished to meet manpower objectives for X-ray technologists?

We decided that in order to approach this question, we had to get some estimate of what these objectives should be. As has already been mentioned, good information on this point is lacking, but we tried to make some estimates along these lines. There are some 1,000 AMA approved schools turning out about 6,000 graduates a year. There are other estimates that there are about 100,000 medical X-ray machine operators, of which 35,000 are active ARRT members.

On the basis of what we have heard here, we may assume that the mean active time in the field is something like five years. Considering only the 35,000 then, it would appear that there may be an attrition rate of some 7,000 a year, for a net deficit of 1,000 a year.

Further, according to criteria contained in a recent planning guide of the American College of Radiology, there is a current shortage of some 10,000 technologists in hospitals alone. Finally, if we accept Dr. Morgan's estimate that the "doubling need" in radiology is less than 10 years, it becomes quite obvious, even with all of the errors in assumptions, that the need is not being met by several thousand a year.

Proceeding from that point, one of the first conclusions we reached was that appreciable programs could not be expected either in quantity or quality unless there are greater financial incentives, greater advancement opportunities, and greater chance for enhanced status among technologists. These have been discussed repeatedly throughout the Conference, but we concluded that unless there is some real progress in these areas, there is little chance of significant advances.

One of the first things that we addressed ourselves to was the question of the estimated 15,000 non-active registered technologists. This is an obvious resource that might be tapped if conditions were right. Later, we will have a recommendation to make on this score.

We then turned our attention to the kinds of schools and the amount of training needed. Clearly, there are no one or two "best" solutions. For a long time, perphaps always - several approaches will be necessary. Clearly, we need a greater range of training or education than is now available.

We reached a general consesus that the two-year hospital-based school should be the minimum that would be considered adequate X-ray technology training, with possible exceptions for dental and chest radiography. The hospital-based school is and will be, at least quantitatively, for some time the backbone of the training effort. Combination college-hospital programs will grow in importance, and this is desirable for reasons that have already been brought out - greater range of opportunities for students, a better environment for didactic training, better screening and counseling services and the like.

One intriguing idea discussed at some length envisions a flexible college program. The first year would be devoted to basic didactic material. The second year would be largely clinical experience, with a rounded program in radiography, therapy, and nuclear medicine. An Associate Science degree would be awarded after the second year. The graduate of this program might be called a generalist technician or technologist. But there would be opportunity for promising and interested students to go on for two or more years and obtain a baccalaureate, perhaps specializing in one of the three areas. These could be administrators, teachers, supervisors, perform difficult special procedures, or act as physician's assistants. There was criticism of specific aspects of this proposal, but it offers considerable flexibility and could be varied for different needs. The general concept appears to have appreciable merit.

An additional suggestion made was for a separate four-year curriculum specially designed to educate teachers of X-ray technology.

There must be more and better programs for continuing education for practicing technologists, including regional seminars and courses, particularly for non-metropolitan areas.

Finally, there is need for a thorough reexamination of programs for evaluating and accrediting schools of X-ray technology at whatever level. There was general agreement that the present system leaves much to be desired. Much more attention should be paid by schools to student recruitment and selection, to attract both good students and persons who have a higher probability of remaining in the field longer than is now the case, on the average. Colleges generally have the advantage here because of their established recruiting and counseling services. But there are other resources in most communities that hospital schools might call upon for assistance.

The present situation as to student recruitment seems highly variable between areas of the country and even between schools in a given area. There are many reasons for this. For example, in the same area, the stipend offered might be the crucial item.

The second question to which Group III addressed itself was: What resources are needed? The issues here were less controversial. It was agreed that existing schools should be made better. We also need new schools, perhaps of several types and levels.

We have four specific recommendations to make in this regard, in terms of needed financial support:

1. Expand existing schools by providing additional physical facilities and libraries and by subsidizing the faculty.
2. Provide training aids for various types including, in addition to the usual audio-visual materials, such things as phantoms and perhaps X-ray machines for use only in teaching.
3. Provide student stipends to help attract and keep good students.
4. Provide opportunities for practicing X-ray technologists to avail themselves of continuing education.

Additionally, we have four recommendations not related to resources:

1. That a pilot study be performed to determine the potential for recruiting former technologists back into the field.
2. That a conference similar to this one be held related to comparable problems in nuclear medicine.
3. That proceedings of this conference be prepared and mailed to the participants.
4. That one or more small work groups be convened by the Public Health Service to develop the recommendations of this conference in greater depth and to outline an action program.

We spent most of our morning session discussing salaries and licensing. Both clearly are of central importance, but we reached no definite conclusions.

DR. CHADWICK: Thank you very much, John. And now the report from Group IV's moderator, Sister Mary Anger.

Group IV

SISTER MARY ALACOQUE ANGER: Group IV began the discussion of the guideline questions with Question 7, What about the need for continuing education? There is a definite need for continuing education, and this may be accomplished by the following methods suggested by the group:

One, inservice training.

Two, expansion of continuing training toward a baccalaureate degree.

Three, continuing education established at the graduate level.

Four, refresher courses and institutes conducted by professional organizations.

Five, short-term technical courses conducted by the United States Public Health Service, Division of Radiological Health, Training Branch.

Question 5 was discussed next: How can training be accomplished to meet the manpower objectives?

First, by the use of AMA-approved schools.

Second, expand teaching facilities. Under that:

a. It was suggested that this might be accomplished by more fully utilizing the inactive registered technologists.

b. Two-year community college programs should be integrated with the clinical environment of a hospital.

c. Have the AMA-approved schools more fully utilize the teaching resources available in nearby universities and community colleges.

d. The general consensus was that schools should be subsidized by government training grants or private funding, scholarship funds and student loans.

It was also suggested that vocational education funds be looked into as an additional source of monies for the schools. In some cases they have not been fully utilized. Some States are presently making available loans to students to subsidize their education. The loans can either be paid back by time in the locality or by reimbursement with interest.

Some participants felt that the hospital schools should receive some tax support.

An important question was raised: Is there actually a shortage of adequately trained radiologic technologists? But this question was not resolved by this group.

It was suggested that better use of available instructional staffs might be accomplished through allied training programs in which basic courses for radiologic technologists would be taught in conjunction with basic courses for the paramedical field.

Question 8: What will attract and retain qualified X-ray technologists relative to working conditions, salaries, professional development, future opportunity, et cetera? Suggestions included the following:

One, increase salaries and have a wider scale of wages.

Two, job satisfaction.

Three, counseling at high school and college level.

Four, advancement opportunities.

Five, schools should be developed in small hospitals in isolated areas.

Six, adequate vacations with pay, fringe benefits and retirement.

Seven, more associate programs should be developed in which the courses offered are acceptable for college credit so the individual can continue his education leading to a bachelor of science degree and a more responsible position in radiologic technology.

Eight, some participants stressed that the terminal two-year hospital program is a handicap for the future professional development of an individual. For this reason, it was emphasized that the hospital schools, which are essential, should be closely associated with the college environment.

Nine, legislation:

a. One point of view held that the pool of unqualified technologists holds down the status and salary of the qualified; and, therefore, this problem would not be resolved without legislation. Standards should be imposed, such as licensing. However, it is to be emphasized that licensure by itself may not increase salary, but will protect one's pay.

b. Another point of view was that licensure would result in a greater shortage of technologists to the extent that other levels of individuals would be trained in order to take the place of technologists no longer practicing.

c. A vote relative to licensure was taken with the following results: In favor of licensure, four. Opposed, nineteen. Undecided, eleven.

Ten, the following resolution was passed by the work group:

We recommend that the American College of Radiology in cooperation with the American Society of Radiologic Technologists and the American Radiologic Technologists:

One, study the scope of current job responsibilities of radiologic technologists.

Two, differentiate levels of training and experience in radiologic technology.

Three, establish a recommended general progression of responsibility, experience, and training as a career advancement criterion for employers of radiologic technologists.

Four, study the wage structure for radiologic technologists' for its effect on the recruitment and retainment of qualified personnel.

Question 4, "How many qualified radiologic technologists are needed in terms of total numbers per hospital, per number of examinations, et cetera, now and in ten years? was discussed next. One, it was the general consensus that on the average 2,000 examinations per year per technologist is an acceptable figure for manpower requirement at this time. For more complex examinations, this number could be much smaller.

The comment was also made that the number of examinations per technologist per year will decrease in time, due to the increasing complexity of radiologic examinations.

Two, considerable discussion centered on the extent of the shortage of qualified technologists. Apparently the problem is regional in severity.

Three, it was also brought out that there is no direct relationship between the number of vacancies and the number of unfilled positions for technologists.

Four, estimates of the number of technologists needed in the future should be made on the basis of the estimated number of future radiologic examinations and other factors. In meeting this need for future technologists, provision must also be made to correct the serious shortages of qualified instructors of technology existing throughout the nation.

Five, to some extent, the future needs might be correlated with the NACOR estimated number of radiologists.

This completes the report of the discussions that took place in Group IV. Thank you.

DR. CHADWICK: Thank you very much, Sister Mary. Before proceeding to the discussion, I would like to express on behalf of the Public Health Service our gratitude to the moderators of these sessions, to the assistant moderators, and to the recorders. As Dr. Heslep pointed out, it is extremely difficult in a group as large as each of these groups was to really distill out of the rather active and sometimes heated discussions that go on into any kind of a consensus.

The reports that I have heard impressed me very, very favorably with the skill that the moderators obviously used in trying to pull a consesus out of some of these subjects in which there is a good deal of difference of opinion.

Of course, some of them are fairly obvious and others are not. But there are some in this field that are quite, quite controversial. It seems to me there are two things we might consider in our discussion. The order might be as follows:

First, is there some area of concern in this field that some of you feel has not been adequately treated by the reports of the discussion groups? Maybe this is rather late in the game to bring up an additional point. But on the other hand, I would hate to have us go away with anyone feeling there is an area that really hasn't been treated adequately in the reports.

The second area of discussion, of course, would be a comment on the conference conclusions and recommendations themselves.

May I ask the audience first, though, are there areas that you feel have not been adequately treated by the reports of the moderators? Yes?

DISCUSSION OF FOREGOING WORK GROUP REPORTS

MR. SHAPIRO: In yesterday's discussion, the question of physics and the lack of physics and the controversy of technician training in physics came up. I think this stems from the lack of recruitment because the high school student is not exposed to the job opportunity in X-rays. He should be exposed in his second year of high school. And he knows that if he wants to become an X-ray technician, he must take physics as one of his courses just as a student preparing for engineering knows he has to take a certain amount of mathematics, a certain amount of engineering.

I think we should emphasize a little more recruitment of the high school student, prepare him, say, in the second year of high school to go into X-ray, and a little more concentration on that end.

DR. CHADWICK: Yes. I think this point was made by one of the speakers yesterday morning, pointing out that perhaps many of the health professions are not adequately discussed and so on in the secondary schools. This may be a problem in recruitment generally. So this very probably is a common problem.

Are there further points that you feel are matters that really haven't been adequately discussed? Yes, Herb?

MR. PARKER: Dr. Chadwick, I think there is some haziness of definition of scope considering that while X-rays are a current tool for certain diagnostic procedures, if present research goes well, they may almost disappear from the field within the next ten years. And it is not clearly defined whether applications of ultrasonics and other modalities should be included in our consideration of technologist training. In fact, one of the definitions proposed today would tend to exclude that and create a new floating class. I think we might consider whether this might not be welded into what we have been talking about.

DR. CHADWICK: This is quite a significant point, I think. There has been some discussion in radiological circles as to who would be concerned with some of these newer devices. Could somebody comment on this point of the inclusion of some of the newer modalities in the general field, whether this is desirable or undesirable? Yes, Joe.

DR. JOSEPH L. IZENSTARK: To reinforce what has just been said, many of the radiology departments in the larger institutions are now putting in ultrasound units and thermography units. So there is a very real consideration for a technological individual to operate this equipment. This might fall into the realm of the radiologic technologist, or we might need another group of technologists. This should definitely have some consideration at this meeting.

Another point, last night there was some discussion about it, but none of the work shop leaders commented on it in their reports, and that is the field of aids that was brought up yesterday. If there is a shortage of technical personnel, particularly in the larger insitutions, we could use the aids to do some work now done by technicians. This would free the technicians to tend to operation of the equipment and to patient care. So this is another point that must be investigated, the use of aids to help solve our manpower shortage.

DR. CHADWICK: Thank you. I think the point about the need for more attention to classification of jobs was made in one of the moderators' reports. There should be an effort, and this was directed, I believe, to ACR and AMA, to classify some of the jobs within the total field so there would be job progression for those that were growing, but also with lesser qualified people doing some of the jobs which don't require such high qualifications. Yes, Mr. Goldman.

MR. GOLDMAN: I think we did mention that in our group. And I think we emphatically stated that we wouldn't support anthing less than the two-year course of X-ray technology and would take no fragmentation of this thing.

However, what I really did want to speak about is something I think we haven't discussed at all. And that is a possibility that the new Medicare program might have a vast effect on our hospital type of school of X-ray technology. With the new mode of paying the radiologist, the school of X-ray technology might very well not be sponsored by the hospital now, but by the radiologist.

This is a very strong responsibility. And I see a lot of connotations to this thing. There might be a lot of abuses. But I think we ought to explore this possibility. I think it is a strong one.

DR. CHADWICK: It seems to me--maybe I am just thinking of previous discussions--that this point may have been alluded to in one of the talks yesterday where it was pointed out that in the past, the cost of maintenance of hospital-based schools has, in effect, been borne by the patient as a part of the cost of radiological procedures. It may well be that the kind of cost accounting which the Medicare program will necessitate may make it difficult in the future for the patients to be charged for what really can't be considered legitimate cost to the patient, at least for the radiological examination.

I think this is a matter of some concern for the hospital-based schools in the future. But judging by all the recommendations for governmental support, presumably they are going to be rolling in wealth shortly. Yes?

VOICE: I believe there is one incompleteness in the reading of the Group I report dealing with the technician's activities directly to the patient and how they might desirably be expanded as time goes on.

DR. BROWN: That is correct, and I hoped there would be time to read that.

It is Resolution No. 10 that Group I recomended. Group I recommends the Public Health Service direct inquiry:

One, to ascertain present limits on the professional activities of radiologic technical staffs; i.e., those which directly relate to instrumentation of a patient (such as injections for excretory urography) or those medical acts more traditionally reserved to the radiologist (such as fluoroscopy).

Two, to seek recommendations for realistically prudent expansion of those limits. This referred to some of the practices that have come to the attention of spot filming for positioning of gall bladder and things of this nature.

DR. CHADWICK: Thank you. May I ask a question? Since I have the microphone, I shouldn't exercise this power, but I am a little bit confused by comments as to whether there should or should not be any categorization of jobs in the overall umbrella of radiologic technology in order that:

First, there might be advancement for individuals in the field from the lower, less responsible jobs, to the higher, more responsible jobs.

And, second, that perhaps the qualifications might be different, either the voluntary type or the regulatory type qualifications. Am I correct in being confused as to this seeming difference or not?

Did you have a comment on that?

DR. WOODRUFF: I think I can comment on that, and then I have another statement or comment. I think as far as that is concerned, certainly we want to echelon the profession of radiologic technology. But the basis would have to be established as far as the radiologic technologist is concerned and as part of the profession of radiologic technology--and I am not a technologist--at the level of an individual who could safely work with patients without supervision. In the opinion, I believe, of this body--and maybe not unanimous opinion, but very substantial--this requires a minimum of two years of training.

Now, the question I would like to address myself to--

DR. CHADWICK:

I see a lot of approval, so it apparently was my own confusion.

DR. WOODRUFF: Now, the question I would like to address myself to concerns schools. I think the involvement of educational institutions with educational resources in the training of technicians is desirable. I am strongly in favor of this. I would, however, submit that this must--and I underline the word "must"--be coupled with adequate clinical experience. This means well supervised, varied hospital experience. There is no substitute for this. No amount of laboratory or phantom work can accomplish the same end.

Then we come to the time factor. How long must this be? I don't suppose anybody can really tell. I agree--as a matter of fact, I accept--the level of 2400 hours of practical experience as a minimum. I am not sure it is enough, but I accept it as a minimum. I think this can be justified only if the didactic work and the work done by the educational institution so prepares an individual that can progress more rapidly once he reaches his clinical stage of training than the individual in the usual hospital-based school. If this can be accomplished, then perhaps this time is justified.

But we are concerned that the individual who is allowed to practice radiologic technology without supervision be able to do so with safety to the patient, be able to do so and turn out a quality of work that will permit the necessary diagnostic accuracy.

Thank you.

DR. CHADWICK: I think the applause for that statement would again indicate approval. And, indeed, as I listened to the moderators' reports, I got the distinct impression that the reports were calling for cooperative programs between academic institutions--junior colleges, community colleges--and hospitals to provide exactly this kind of thing. At least that came through rather clearly in my listening to the moderators' reports.

Now, any additional items that you feel did not--Yes.

VOICE: I have heard this term "nuclear medicine" bandied about here as a category of RT diagnostic, RT therapeutic, and then something up here as a postgraduate thing and nuclear medicine. It has not been brought out, I think, that there are in this field of nuclear medicine--and this is with a big quote and we could have a long discussion as to what this is--that this mechanism of entering the field of nuclear medicine is not limited to a two-year RT course and postgraduate course in RT. I think this should not be left unsaid. I think there are many people getting into this field of applying radiation to individuals who grow up in nuclear medicine, not through this mechanism.

I wouldn't want to limit the field of nuclear medicine to this method of entering the field.

DR. CHADWICK: Actually, this entire session we have directed relatively little attention to nuclear medicine. This was more or less intentional. We feel the problem of X-ray diagnosis is the most critical one and this should be the focus of our discussions at this conference, so we were not shortchanging nuclear medicine; we simply were not considering it at all this meeting. Yes, Dr. Nelson.

DR. NELSON: Because of the recommendations of Groups II and IV regarding the necessity for studies to determine the short-term need for the number of technologists, I should express my high hopes that the ACR Planning Guide for Radiologic Installations which I understand is imminently due to be published by Williams and Wilkins or has been published in the last few days by them will provide the results of a study done in 1964 by Dr. Cooper in Memphis among radiologists in hospitals.

It is my understanding data from that questionnaire will be in the current issue of the Planning Guide. And the version that I saw several months ago gave the results of the 1964 study, suggesting the need for technicians in various size hospitals. It also discussed the numbers of technologists and student technicians in various-sized hospitals, as well as the numbers that were needed then. We should be able to make some reasonable projections without waiting for additional studies. It seems to take inordinate time to get valid information of this sort.

DR. CHADWICK: I have been impressed in listening to the discussion in Group II and also in the moderators' reports with what seems to be a clear indication that it is not the total number of available technicians that seems to be the primary problem. It is the leak in the bucket, if you will, that is causing more difficulty than the number of technicians presently available.

I did some quick calculations as the figure of 2,000 examinations per technologist per year was given by, I believe, Sister Mary Anger. That would require about 45,000 technologists since there are about 90 million radiographic procedures per year, exclusive of the mobile chest survey. There are about 15 million chest survey films and about 90 million medical radiographic procedures. If you do a little simple division, you come out with a figure of about 45,000, which is about the number that are presently registered in the field. I realize that some of these are not active, however. Yes.

DR. WOODRUFF: That is a bit oversimplified, I am afraid, simply because people are not so disposed that they can perform the maximum number of examinations of which they are capable. So it would take a larger number than that.

DR. CHADWICK: Well, I realize that it is quite an oversimplification because in some instances, many more could be done and in some instances, very many less. But at least, as a kind of ball park feeling, it seems to imply that the leak in the bucket may be the more serious problem. Yes, Alex.

MR. GRENDON: Just a trivial one in the report of Group IV which I noticed confused some people here and I am sure confused many others.

When Sister Mary Anger read the report, she spoke about the number of vacancies not representing the number of opportunities for employment. What was referred to were the number of vacancies in schools. The number of vacancies for training do not necessarily indicate the number of opportunities for employment. This, I think, was just an oversight in the drafting of the report.

MR. SMITH: Dr. Chadwick.

DR. CHADWICK: Yes.

MR. SMITH: As a respresentative of the Department of Labor concerned with manpower development and utilization, I would like to say how rewarding and gratifying Group IV's endorsement and more than that, strong resolution, of modern personnel management practices in recruitment and retention, promotion and wage structure is. This is the matrix that will determine the solid professional development we all want.

I would like to carry that message, if I may, back to my people and say we want to be in on any of your future conferences. Thank you.

DR. CHADWICK: Thank you.

I am looking forward to participation this afternoon by Professor Jacobs. As you will notice from your program, we have Professor Walter Jacobs, of the Department of Government and Politics here at the University, who, after listening to all of this for two days, is going to try to pull it together. As a person outside our special field and not used to all of our cliches, he will try to distill out what he saw as the major problems and some of the important solutions that were offered.

Further? Yes, Russ.

MR. COWING: My question is this: In Group II, we had considerable discussion relative to the status of the technician in the hospital structure. This includes nursing structure, chem lab structure, and all of the structures within the hospital unit. Group IV reported on job satisfaction. I am wondering if this is the same thing.

SISTER MARY ANGER: We weren't discussing job satisfaction. We were discussing what we could do to retain people in the field. That was one of the avenues to job satisfaction. We made no attempt to say what job satisfaction really is.

We also recommended a study be made of job analysis. But we didn't try and define it. Am I right, Dr. Woodruff?

DR. WOODRUFF: You are quite right, Sister.

SISTER MARY ANGER: We made no attempt to actually describe or define it. We brought it up. We examined it. We hoped everybody would think about it and have job analyses in their departments when they go home. It is really something in the future, but many people are already doing it.

So I think it was touched upon, but that's about all I can say. It was touched upon. I am sorry, but I just can't tell you just how to do it at this time.

MR. COWING: Thank you, Sister.

DR. CHADWICK: That is quite a question--job satisfaction. We have to consider that too.

Are there further comments now and questions on the moderators' reports? Yes.

MR. HOSKINS: May I bring forth a private enterprise idea? College teaching demands a different kind of book. With all these eminent authors here, I appeal to them to think of writing the kind of book that we need. We need specialty books now. We don't like the omnibus book typical in the X-ray field. You know, the kind of book that has some physics in the front and then a word or two about ethics and then it gets into positioning for the rest of the book. We want specialty books. In junior colleges, we have a series of courses, and we would like to have a series of individual books for each course.

Some of the books coming out of England now are just this--good specialty books. But the terminology isn't always good. So I hope a few of you authors will consider the thousands of books that are going to be sold.

Junior colleges can force student to buy books. And they generally keep them. So there will be thousands and thousands of books sold that weren't being sold under the old apprenticeship system.

DR. CHADWICK: Yes.

MISS FOSCH: May I ask a question relevent to that because I think, to a very large extent, the curriculum is determined by it? There might be some discussion about the examinations and its make-up for the registry, for instance.

Now, everyone has his own idea of the curriculum. And perhaps in my case--teaching physics over the years--I have almost come to the conclusion the two-year hospital-oriented course has perhaps had too much academic or theoretical physics. Perhaps we should try to get more and more of the practical aspects and physics that will give them the overall concept, the principle, but not too much detail on electrical make-up in the transformers and so on.

Again, one can't get too far away from the final examination. And when you come down to it, it is always on the final examination. The operation of the transformer is on there. One has to continue teaching it.

Now, maybe in re-evaluation, such things are not necessary. The longer I go along, the less I think perhaps their details are in the overall picture.

I wondered if we could have some general discussion about the examination which is determining to a large extent the curriculum. I am sure that is true in other aspects than physics.

DR. CHADWICK: Could someone from the Registry briefly summarize the major content of the examinations?

MR. McGOWAN: First of all, it is the other way around. The examination is made up from the curriculum--the recommended hours on each section of the curriculum--these are reflected and weighted accordingly in the examination itself. Our questions are cross-indexed and categorized according to the curriculum and will remain that way until the curriculum is revised or changed.

DR. CHADWICK: I see. The other Registry?

MR. WILLIAMS: Essentially the same.

DR. LODWICK: One additional comment about the Registry examination. We tend to cover three fields even in the X-ray examination, including radiation therapy and isotope.

We have consultants to the Registry who come in, go over the examinations with us, help us with new questions. Some of these consultants are here. We feel this way we are able to keep our examinations up to snuff.

DR. CHADWICK: Yes, Mr. Parker.

MR. PARKER: Dr. Chadwick, I am glad someone finally mentioned England. I had hoped to see a recommendation to study the training of comparable groups in other countries which are advanced in the X-ray arts--England and Sweden as notable examples.

Even if we conclude that what they have done is all wrong, we could save a great deal of money and time by first analyzing carefully what has been tried already in other environments.

DR. CHADWICK: Thank you. May I just comment on that? Mr. Parker at our request did such a study in radiological physics of the programs in other countries. And that has been extremely helpful to us.

One other thing that occurred to me as several of these subjects were being discussed--the problem of the need for a high level of engineering was mentioned in our group, because of the increasingly complicated systems of X-ray, television and what not.

I think many of you are familiar with the fact that Dr. Dale Trout at Oregon State University has started a program of teaching X-ray science and technology to engineering students, hopefully to develop engineers with special competence in the area of X-ray systems so some of these very complicated beasts can be made to work correctly. A point made in our group was that oftentimes the systems are incorrectly matched. And here again is a physics and engineering problem of insuring that these complicated gadgets are developed, set up and operated properly.

Now, pardon me. Go ahead.

MISS TOLAN: Extensive communication was carried out with England and Canada to set up several of our curricula. We are very familiar with the fact that their primary education is somewhat higher than that in the United States. This inhibits us somewhat in following exactly, but we have felt a cooperative effort would help both technology and radiology. As a consequence, we did carry on extensive communications with them prior to writing up curricula. Simultaneously, we have a cooperative effort in regard to the examination for technologists.

DR. CHADWICK: Yes.

MR. BOSTROM: I am primarily a buck passer. I would like to ask the moderator of Group I to explain for all of our benefit a very small recommendation, number seven, which states: Group I recommends the Public Health Service should compile and circulate unique elements of successful training programs.

This was read rather quickly, but it has some very interesting aspects behind it. And

I would like it to be made known to the group.

DR. CHADWICK: Dr. Brown, would you enlighten us?

DR. BROWN: I assure you since he was our recorder, he already knows the answer. But I also can say he was not planted. Well, in our discussion, we learned that there were some junior college programs in California that have been in existence over 15 years, successfully. They attract a three-to-one ratio at times for their available positions with counseling services established at the high school level. They reach into the labor pool in a manner that has been asked for here. There are others in Oregon and there must be others elsewhere in this country.

These are the things we are talking about. Around our country are highly successful programs operating at the level that we have envisioned and which have not gone unnoticed. To be sure, their very success means they have not gone unnoticed. But we felt with one thousand approved schools communications have not been as extensive as they might be. And, therefore, we tried to keep this general.

It is rather brief, but these were the unique elements--the elements of success, the elements that are doing the job that you have asked for. We don't believe that in total the job is not being done. It is just that we want to bring together and become informed about other countries experiences. We also want to stay informed about ours because, of course, this country is well aware of what goes on in the world.

In every area where people direct their attention to this, the first thing they do is accumulate the literature of this country and of England and of Sweden and of France. I am sure--at least in my mind--that the people who are working with the Registry, with the planning of curricula, and with all the other things we are talking about, have most certainly assembled and evaluated these areas of inquiry.

This is what I think we meant by recommending that the Public Health Service should compile and circulate the unique elements of successful training programs and bring them to the rest of us. I might say at the request of the American College of Radiology and with support of the Public Health Service and the American Medical Association, Mr. Olden and I will go to California to visit the junior college training programs there and try to determine precisely what was asked.

DR. CHADWICK: Yes.

MR. WILSON: First of all, Dr. Chadwick, on behalf of the Board and officers and all the members of the American Society who are here, I want to thank you, all the people who are responsible for the conference, for the invitation. We have truly enjoyed being here. I believe it has been a truly profitable experience.

There is only one other thing that I think I ought to remind everyone of. As I sat and listened to the reports, I have heard requests for funds from your agency for surveys and studies, graduate education, conferences, seminars, construction of classrooms, stipends for students for two-year schools, stipends for graduates of two-year schools, for phantoms, programmed earning, teaching aids, construction of educational facilities, student loans, scholarship support for 24-month schools, travel funds for speakers, honorariums for speakers, financial support for instructors and funds to stimulate wages.

Well now, friends, it is our taxpayers' money that these people are working on. I don't really think Congress is going to vote another $20 billion next year to take care of us. I think it is our responsibility if we are going to ask Public Health for help--obviously, that is what many of us came here for as responsible individuals, and I think we all are--we should place some kind of priority and tell Public Health the primary area in which we need assistance--if truly you feel we need financial assistance rather than this Pandora's box of requests.

Thank you.

DR. CHADWICK: I thought perhaps we were going to lead a raid on the U.S. Treasury. John, would you like to try to grapple with that?

DR. HESLEP: I think his point is very well taken. I want to reiterate a recommendation of our group that I passed over rather hurriedly because I think it is obvious that 302 people in a little over a day and a half can't come up with any really definitive priorities. Therefore, one of our recommendations was that the Public Health Service consider convening one or more smaller planning groups, smaller and perhaps with more time to zero in on the recommendations and try to make them more definitive and set some priority.

I think this would be the next step that I would propose on this.

DR. CHADWICK: I think Dr. Heslep's point is well taken. It is difficult in an assembly of this sort to take recommendations down to the highly refined level. I don't know whether you want to pursue this matter any further and attempt to set some kinds of priorities or not.

I do want to make one comment of my own, since presumably I would be one of those to lead this march on the Treasury. The thing that concerns me a great deal is that most of the recommendations, as I listened to them, were for funds in support of teaching and schools, seminars, traveling seminars, lectures, and so on--most of it was support for teaching of technologists. The leak in this bucket is so large. The turnover rate is so great among technologists that it seems to be a somewhat uneconomic process that we are going through here--training as many people as we are and losing them so rapidly. It almost seems to me that if we were to look to resources for strengthening the teaching of technologists--and I certainly am not against this in any sense of the word--we would have to look at least simultaneously, if not a little bit ahead of that, to ways in which we can reduce the enormous turnover rate. Otherwise, we are spending a great deal of the taxpayers' money--if it becomes a publicly supported program--to train people only to have them leave the field after a year or two and turn to some other endeavor.

I really think this is a matter of serious concern to all of us. We must think about ways in which we can stop that leak.

Would you want to press this matter of priorities any further or not?

DR. BROWN: Because that was specifically considered in our discussions, perhaps I should try to reply to it. We learned that some of the schools we recommend supporting have as high as a 92 percent ten-year retention of their graduates verified by direct correspondence. This is one of the successful elements we speak of that is not widely known. And it is believed that if this kind of educational and professional attainment can be achieved, the students who go into this program will be more highly motivated with a career in mind and perhaps they will stay.

It is perfectly possible to fragment the construction of a television set into such small operations that people can move from the benches without any training. And a very elaborate and sophisticated instrument can be constructed. If I gathered your intent, it was that you did not wish to do this to X-ray technology. And, therefore, inherent is the development of this profession.

It is true we have had a lot of people moving in and out, but maybe one of the reasons our group felt that this has happened has been inherent in the system of acceptance of people, of the recruitment, of the counseling, of how they came in, the determination of who they were and why they wanted to be and what the career was like. The attrition rate of people who got into it and decided they did not like it is very high.

Even in medicine 10 percent of starting people do not graduate, not because they fail, but because they realize that they don't want to be physicians. This is going to be true throughout.

But I was most interested to find that there is in operation in this country a school with a record of this kind. It was most amazing to me.

Our recommendations for support of the specific educational effort is based on the testimony and the discussions of our group which showed that here is where the leak in the bucket might be stopped.

DR. CHADWICK: Do you wish further comments on that point?

SISTER MARY ANGER: I think some of our trouble is that we haven't had the financial support we needed to develop our programs as we would have liked. I think if we could get some support and update and improve our schools, we will get the higher qualified people, we will get people who are motivated to stay in. That is why we are hoping we can get some help for schools in radiologic technology.

I think we have been left a little behind. I don't think we have gotten some things that many of the others have--nursing, for instance, and physical medicine. They have all been supported by some group--not necessarily public health, but some group.

We have one program with about 80 students all the time. About a third of those are supported by--it is in physical medicine, anyway--a national group that gives all the money to the Director of the department, who pays the students' tuition. They have a wonderful program, and they have a large group.

You don't hear anything about them being short of technicians. There are plenty of them because they have support we don't have. And I think this is why we are asking for it for our schools.

I don't think we should build on the past, how bad we have been. I think we should like to know how good we can become if you help us.

We are well established more or less in our own school on two areas. That is, the general roentgen technique and radiation therapy technology. I don't know how we are going to get nuclear medicine off the ground. It is going to need somebody.

Most other areas can find an instructor, you see. We don't have the money to pay them because we have small numbers. Universities don't pay large salaries for a few students. So over 30 years we have been able to manage real well on practically nothing, principally because I have had control or good rapport with all of these people.

Now, I have the same thing with the Department of Nuclear Medicine, but I don't think they have the people to give us because they are obligated to the medical school and they are paying all these salaries. We can't pull these people out, you see, for two or three or four or six students. So I don't know what we are going to do, but when you give us the money which you are going to I am going back and say, "Now, it is time that we get all these people."

We have about four students who ought to go on. And I say I think within another year or so, we will be able to take care of all these things. I am bringing them up to nuclear medicine--these people are interested in it--and trying to encourage them to think. I am confident that we will have it at that time, but you get my point.

DR. CHADWICK: Right. Yes.

MR. DIEGEL: Dr. Chadwick, may I make a statement? I think it might have a bearing on the overall education structure. This is directly in relation to the amount of education a person receives in salary.

The high school graduate probably gets less than $4,000 after he graduates from high school. It sounds rather high, but if he goes into industry and works on piece work, he can make plenty of money with very little on-the-job experience.

An X-ray technician as far as I can determine probably makes from $3,000 to $6,000 after only one year of academic training. He goes two years to school, but gets one year of academic training and falls somewhere between $3,000 and $6,000. Perhaps the median would be $4,000.

I am investigating the radiological health program that graduated its first graduates this past April through June. And we are probably now where you people were 45 years ago.

These people get two full years of academic training and in many instances on-the-job training during the summer. So it would be likened very much to your two-year school.

I am not going to say, because it is confidential at this time, but one of the graduates is now employed in a very large hospital east of Chicago. He was offered $7,200 the day he graduated to work in a nuclear medicine facility.

The average of all the students as far as I can ascertain--and I haven't gotten back all the questionnaires--there were only 38, by the way--run from $5,000 to $8,000. This same student could have received $8,000, but the director of the school thought this was out of line and requested the institution only offer $7,200.

We ran recently in the Health Physics Society a survey on salaries--Dr. Van Wyck did. I am just going to pick those with less than two years of experience. They take a fellowship, an AEC fellowship, in health physics. The median salary for this group--with no experience or less than two years--was $8,000 to $9,500. This was for students with the baccalaureate degree.

So according to statistics here, and I am scientifically on thin ice because I only have 38 students to follow up and I don't even know if they are going to stay gainfully employed in their present positions, it seems that with the one year of academic training, and with the two years that the graduate that goes into nuclear medicine, he is getting paid dollar for dollar for the amount of education he has. And the baccalaureate with the one year or nine months of physics is also getting paid for education.

So everything seems to be in line. I would like to now make an assumption. If we are where you were 45 years ago, we have made remarkable gains in the first two years by utilizing the two-year academic course and getting much more status and prestige than you have had in maybe 47 or 50 years. So if you haven't been doing very well with hospital-trained people, perhaps you should look forward to expanding into a two-year community college where you can get a lot of academic training and then on the job training.

I am not going to suggest this because everybody seems to think patient care is so important. Everybody downgrades the use of phantoms. I think perhaps this will come. Maybe you can get a postgraduate for one year that can actually handle patients, but it seems to me they are getting paid dollar for dollar for the education they are receiving.

DR. CHADWICK: Yes.

MR. DUNN: Charles Dunn, Washington University of St. Louis. I am registered in radiologic technology and in nuclear medicine.

The gentleman says we are being paid on the basis of the time we spend in academic work. I think this is a little bit out of line. Quite frankly, I am being paid to do a job, a job that I actually did not spend a great deal of time in school on.

The fact that these people are working as nuclear medicine technologists and getting a good salary is basically the rule of supply and demand. There are darn few registered nuclear medicine technologists. And the ones that are registered can expect a good salary.

I think that mine will go gradually up, but I don't think it would be fair to expect that I walk right into a $8,000 job just by virtue of two years academic training.

DR. CHADWICK: Well, unless there is some further comment or question, I want to thank all of you here in the audience as well as the moderators and those that prepared the reports. Did you have a further point? Go ahead, please.

MR. DRIVER: Excuse me, Dr. Chadwick. I was trying to get this question in at the conclusion of all the discussion as it is a little bit off the subject.

I was wondering if you will notify or give us a rundown of our conclusions of this conference. I realize all of us have taken notes. And, incidentally, I want to compliment Mr. Dahl. If you stay here one more day, I will need a new notebook.

But I am sure this question must be in the minds of many of us. Will you send each one of us a breakdown of your conclusions, or will we just hear from the Board of Health?

DR. CHADWICK: I am sure I should have made that clear. We are planning to publish the proceedings of this conference. Our people will get to work on this just as soon as the conference is completed. And we will try to move as rapidly as possible to get the proceedings of the conference published. I should have indicated that to you much earlier. I failed to do that.

We will reassemble here at 1:30 for the concluding session. Thank you.

(Whereupon, at 12:20 o'clock p.m., the meeting recessed, to reconvene at 1:30 p.m. the same day.)

Third General Session

CONFERENCE SUMMARY

DR. CHADWICK: Just to give you a little idea of what we hope to do this afternoon at this session, we have repeatedly emphasized the difficulty of trying to come to definitive conclusions in a session of this sort. And I don't really think that this is the purpose of a meeting of this sort--to really come to definitive conclusions.

I think we have really rather tried to compare thoughts and to come up with various alternative ideas about the problems of providing adequate numbers of well-qualified technologists. And so, although this session is listed as conference summary, I don't think it is quite what we should have called it.

What we would like to do is have several people react to all of the discussion that has gone forward in these past two days.

There is at least one change in the schedule for this afternoon. You have listed in your programs as one of the discussants this afternoon Dr. Richard Chamberlain.

Dr. Chamberlain, as many of you know, has recently been through a very serious illness. He did not feel up to staying through the entire session, and so he will not be appearing.

Appearing, not as a substitute for Dr. Chamberlain, but very much in his own right will be Clark Warren from the William Beaumont Hospital in Detroit. He will consider this conference from the point of view of a radiologic technologist.

Well, to start out, I thought we would hear a reaction from the outsider in our midst.

We discussed this morning that we are going to plan a raid on the U.S. Treasury. We have a political scientist here with us this afternoon who really should be wise in the ways of leading raids on the Treasury. This is Professor Walter Jacobs. I mentioned his name this morning. He has been bravely and patiently sitting through all of these sessions so he can try to pull out some of the key issues raised in the conference and perhaps give us some solutions or keys to these problems.

So without further ado, Professor Jacobs. I might mention he is associate professor in the Department of Government and Politics here in the University of Maryland. Professor Jacobs.

DR. WALTER D. JACOBS: Thank you, Dr. Chadwick. And I want to thank you for the opportunity I have had to react here, react to nuclear medicine.

The level of this conference has been very impressive. The arrangements made by Mr. Dahl and his associates at the Public Health Service, the attitude of the participants, the professional attitude throughout, have been very impressive.

I have learned quite a few things since I have been here. The problems that you have discussed have been very well articulated, it seems to me. There has been thoughtful preparation and useful activity here at College Park. The prework, the work done before the conference convened here, also was very useful and very pointed. I should say particularly that done by Dr. Chadwick, Dr. Mauch, Mr. Dahl and many others.

The program, it seems to me, has concerned itself with problems which are not entirely in the range of technicalities, not entirely in the range of mechanics, but which have a very definite and continuing political tone to them. And since I concern myself with politics, this is the area of your discussion that has impressed me.

It is necessary at all times, of course, to relate to the political nature of problems, not only for those mundane purposes of raiding the Treasury--and so far as raiding the

Treasury is concerned, I have always thought the medical profession was much more competent in that than the academic profession, and I should like to get a few ideas from you on how this is done from time to time. But before you do go into a new program, if that is what is really involved here, a new Federal program or a new State or local program, for the training of X-ray technicians and related skills, it is necessary, I should think, to examine the available, existing resources, to exhaust the existing remedies, before stirring up or creating a new program.

All the resources and remedies available to you, it seems to me, have not been thoroughly discussed here. The amount of funds available through legislation on the books and the amount of funds that are available through other sources deserve close scrutiny.

In this connection, if we are not talking about Federal funds, we are talking about State funds, or private funds. This is really an area for political operation.

One of the interesting presentations--they were all very interesting to me--but one of the very interesting ones was that given by the three competent gentlemen from New York who got through a licensing program. And the description of the program itself was very enlightening. But more enlightening to me was the manner in which the job was done. Discussions of what is going on in California with reference to the same problem are extremely enlightening.

At least, these discussions have suggestions for possible political activity. I have asked several people from California and from other States what is the view of Mr. Reagan and Mr. Brown on licensing, licensure. And the answer that I have repeatedly got is that both Reagan and Brown are more likely to be influenced by an organized group of M.D.'s than they are to be influenced by an unorganized group of technicians. That may be putting it in hard terms, but it is one of the realities of political life.

I don't know, and I haven't been able to judge clearly here who is in favor of licensing--that is, the M.D.'s, the physicians, or the technicians. But in any case, if there is to be influence in Sacramento or, for that matter, in Annapolis or Oklahoma City or wherever it happens to be, it is necessary to have political organization.

Well, the physicians and the M.D.'s certainly have this. But I think it is fairly obvious to us here that the technicians, the R.T.'s and so on, do not have it.

Politics, political organization, exploitation of existing resources, brings to mind the subject of Medicare--Medicare which was so frequently discussed in these halls in the last two days in all the titles and supporting programs. There are various Medicare opportunities available. However, none of these titles or programs is designed for purposes similar to the subject of this conference. The opportunities and possibilities of exploitation of Medicare are great. But so far as I can see and so far as I can determine from talking with the experts here, there is nothing in any of the Medicare titles that is directly related here.

We had a very interesting off-the-record session last night. I hope that my remarks here will not violate this off-the-record nature. We were discussing OEO, Office of Economic Opportunity, and related areas. Any of you, I think, can train darkroom assistants more inexpensively and more efficiently than could the poverty warriors, to say nothing of training homemakers.

But what we are talking about here, really, if we are going to take little chunks out of the jobs of radiologic technologists, we are really talking about the training of orderlies. And I think if we are going to do that, we should give them the proper name.

But with reference to the whole OEO approach, this is political. The OEO approach is an attempt by the "ins" in this country to create and maintain a political clientele. It is not really an attempt to create trained technicians or trained persons or any related skills.

The poverty corps or the war on poverty in essence is a systemized and structured extension of the civil rights movement. And to attempt to solve your problems by going to the OEO, any of its areas, seems to me ill-advised.

These remarks are extremely discursive, and I am sure you already know it.

The economic rewards to radiologic technicians is another matter that has frequently come up here and one which seems the most difficult of solution.

You may consider the technical matters much more difficult, but to me, as a layman, it is the economic rewards.

How do you reward a trained radiologic technician? How do you get him more money?

Well, we are now in a critical national economic situation as evidenced by the continued decline in the stock market, the lack of confidence in some government programs, and so on. It is difficult to see what is going to be the outcome of this present economic situation.

But we do have at the same time, I have read in the New York Times, an astronomical rise in the cost of hospital--Well, when you go to the hospital, the costs are high, a rise that is far greater than the national rate, than the increase in the cost of living, which would seem to indicate if these two are put together that the position of the X-ray technician and supporting skills may be made economically desirable by forces that are not at our command. Of course, this is a matter separate from that of quality.

Another solution, not the working of the economic laws outside the hospital, but one solution to the economic problem has been suggested in some areas is that of unionizing, organizing, the skills. This is a matter that has developed to some extent in California and has been threatened in other areas.

If this is the case, if we are going to unionize R.T.'s, we had better stop using such terms as "a profession," and talk about the R.T.'s as a craft or as a skill. But, again, here is something that is mentioned only in passing in these sessions, but which has long-range problems for you and for me.

Politics and funding: The availability of Federal funds for the various types of programs suggested here has been discussed in some detail. The funds, it would seem to me, would be available from a number of sources, including Federal sources, but more likely at the local level where education is a primary responsibility.

Politics of training is also a definite matter here. This is the politics of whether you are going to do this sort of training--improve the quality and the quantity of R.T.'s--whether you are going to do it on a purely hospital-based program or whether you are going to do it on the community college basis. It is not purely a matter of what is the most efficient and the best way of doing this.

There are politics in these two approaches. Again, I think it requires some candor to say this, but it should be said. Those who support the hospital-based training program have political basis for doing it. Those who support the community college approach have a political basis for doing it. And those who suggest a compromise are the best politicians of all.

To the medical profession, the practice of politics is second nature. And for me to give advice on techniques would be highly redundant. But it may be necessary to stress again a point that I touched in passing. That is to say that the economic interests of the radiological technicians and those in similar jobs and the interests of the physicians may clash in certain cases. This may be the basis for the difficulty on the licensing question.

It is necessary to point out, too, that many of you professionals have used expressions here which were sort of a shock to me. That is, such expressions as the "health industry" and the "health business" and other terms that tend to stress mechanical and technological aspects of the field.

Of course, we are concerned here with technical and mechanical matters. But we, you and I--I have been here with you for two days now, and you have been so courteous and warm that I have empathized myself in a radiologist or radiological technician--have to decide whether or not an R.T. is a professional. If he is a professional, then he has to be treated as such. If not, then you professionals, you physicians, have to face the problems of dealing with an organized craft union.

Now, whether or not this is an accurate description of what has gone on here, I don't know. I do think that the response to the questions of how you keep the unqualified

X-ray technician from using the machinery was about the poorest of the bunch. There wasn't any good response that I heard. That other panel that I didn't attend probably discussed how you keep the unqualified technician away from the X-ray machine.

All of the other questions--it seemed to me--were considered, particularly those of the continuum of the career, continuing education, advancement opportunities, that wonderful session last night, particularly Dr. Stickley's remarks, all seemed to be covered, all but how you keep that unqualified person away from the machine.

Well, if there were a lot more laymen in here besides me, we would all just stay away from the X-rays in the future.

But the Public Health Service has called a conference, it seemed to me, on the basis of good planning. And if they are as happy as I am with the response to this, why, they are, indeed, lucky. Thank you very much.

DR. CHADWICK: Thank you, Professor Jacobs. I think you really, from my vantage point, touched on probably the exact weak spot here--this matter of what does one do about the unqualified person. I do have the feeling myself it has not been adequately treated in the sessions. I think your point is very well taken.

We will give the audience a chance to react to the comments that have been expressed at the end, but I think we will go forward now with the other discussions.

As I indicated to you earlier, Mr. Clark Warren from the William Beaumont Hospital in Detroit has very kindly agreed on very short notice to give his reactions to the conference and, in a sense, a summary from the point of view of the radiologic technologist.

MR. CLARK WARREN: Thank you very much, Dr. Chadwick. Ladies and gentlemen, my friends: This has been a most interesting and valuable conference, hasn't it? It had very many unique features, starting as I walked in and registered and somebody handed me an envelope with $30 in it. This has never happened to me before and it pleased me.

I had come, as I am sure had many other technicians here, with a certain amount of trepidation as to what was going to happen to us while we were here. I think the turnout of technicians and the number of folks in attendance has exceeded expectations.

A great many people may have come out of curiosity. I believe most people came out of an honest and sincere interest in their field. I think surely this is what brought the technicians here. Hearing the technicians as they spoke throughout the meeting and as they conducted themselves through the meeting, with such attention and obvious interest, anyone who might have been confused or uncertain about the attitude of technicians toward their profession--and we choose to call it a profession although we do not yet feel they call us professional people--we feel that the attitude of these people has been so clearly demonstrated here that no one can question our right to participate in conferences and help plan for our own future and for the future of technology and radiology.

I speak today as an unexpected invited guest, speaking of my own impressions and what I consider to be the impact of this particular conference on the X-ray technician in attendance.

In the first place, I don't think the technicians need to be in any way on the defensive on their accomplishments to this point. I had the feeling through a certain part of the conference that the technicians and possibly the radiologists, too, felt a little on the defensive on the educational system and the mutual rapport and interrelationship they had built up between them throughout the years. It has taken too many years of hard work and too much vision and too much unending effort to build up a satisfactory working educational system that was turning out technologists who were competent, who were knowledgeable, who could step in and pick up increasing work load, and who could do this efficiently and without unnecessary exposure to patients, to be on the defensive.

I think myself that with the aid of radiology, and I certainly want to emphasize the fact that we would have been helpless without radiology, with the aid of radiology, but nevertheless mostly by their own bootstraps, technicians have pulled themselves up a long way in the matter of education. The AMA-approved school has been the core of educational activity that has produced our X-ray technicians in the world today and is going to continue to produce the bulk of them for a good many years to come.

We need not feel defensive about this. I do not, and I don't believe the technicians do as we are about to leave the convention.

Now, we have had some problems with our training programs. These are the things that really concern technicians the most; their own basic education and their own continuing education.

Anyone who has never attended a national convention of the American Society of X-ray Technicians should do so. If you go to just one of these and watch the educational pattern, and observe the tremendous amount of time and interest these people pour into learning what they can while they are there, you would never again question the sincerity of their interest in their own field and in their determination to advance themselves and increase their own proficiency. Truck drivers, who make more money, don't do this. I think this in a way makes us professional people, although we are not considered professional people.

We say we have had problems. We knew what they were before we came. They were discussed at some length while we were here, and we were, therefore, able to contribute to some extent.

In the first place, we know that we need teachers, that we need more competent teachers. We know that the hospital-based training program may not be the absolute ideal. It is the best we have had. It is the way things have developed.

We have strengthened it to quite a point. We have turned out quite knowledgeable technicians, actually. And we have set up a national pattern for education with national curricula and national teaching outlines that make it possible to have uniformity of training all across the country, a national pattern.

Technicians by and large, interested teaching technicians with an interest in their profession, do not want to see this diluted and broken down into 50 separate educational systems for technicians in 50 separate educational states. We know that we need teachers. We know that the teachers we have need more help.

We learn here that we might expect to get a little help in this regard. We are glad to hear this.

We know that technicians should have a broader educational base, particularly those who hope to advance and contribute more to their field.

Forgive me if I say they hope to contribute more to their field because they are far more interested in contributing to their field than they are in the actual number of dollars. Most of them feel far more interest in their vocation and its advancement than in the exact number of dollars that come back in the pay check.

This is a brash statement, but I believe you will find it actually true.

Here, if you are offering us hope of continuing education on a broader educational basis, not only for the technicians who may follow us, but for those who are now teaching, we eventually may look for help. We may be able to turn out more knowledgeable technicians who will do a better job. And if we can turn out a greater number of them, this will help us, too.

We need more men in the field. Is this because we don't like the ladies in the field? God forbid. It is just that the ladies don't stay in very long.

These things have all been said.

We want men in the field. The ladies want men in the field, too, because sometimes there are heavy patients to be lifted from stretchers onto tables and from tables back to stretchers. Although we have equal pay for equal work when there are heavy patients to be moved, they call for the men.

We need men in technology because the men get married to their field. When their wives get pregnant, the men dig their noses harder and harder against the grindstone. We like this because it keeps us supplied with good, dependable men who have a closer and closer interest in their profession as they go on. And we are losing them.

We haven't said very much about the way we lose them, but we lose them primarily to commercial companies and X-ray products companies as detail men. We lose them because this is in the same general field, and they can earn much more money than we can. And a man doesn't have to stick his head up very far in this profession before he is bombarded with offers of commercial employment.

So, to keep the men in technology, we must make it attractive for them. We have learned of a few ways by which we might be able to accomplish this.

Salaries, by the way, are something almost never discussed because the American Society of X-ray Technicians is not a bargaining agency and never will be a bargaining agency. It is dedicated to continuing education and the increase of our own proficiency. It is a scientific society. We have always considered it that, and we hope always to consider it so.

We have not been talking much about the salaries from the podium of the American Society, but here we have been able to speak freely. The best way to keep the men is make the field more financially attractive for them. If this makes X-ray technology more attractive for the women, we would like it to be more attractive for the women, too.

I don't believe this is going to keep most of the women in the field much longer because marriage and pregnancy happen along the line. Sometimes technicians haven't planned to leave, but they do leave.

We have learned that it may be possible to institute procedures by which we can possibly entice them back into the field later on. This could be extremely important and helpful. If we can plug up this leak, we will have accomplished more than add to the number of technicians we can actually train.

As to recruitment, technicians have done most of the spade work in this area because it is seldom that radiologists have the free time and inclination to go out and address the little high school people. The recruitment is mostly done by technicians.

I think we need a lot of help where recruitment is concerned. We don't have the recruitment aids we need. The technicians have paid for many things themselves which are available on loan from the Society, but we don't have the propaganda in the newspapers, we don't have the magazine space, and folks don't hear very much about X-ray technicians. We don't have a bright image, and we therefore don't have a wide selection of students.

If we did have a wide selection, we would insist that students have physics in their background. But if we happen not to have any applicants who have had physics, we can't very well close down the program for a year. And we don't have time to start over and give them a complete course in basic elementary physics. We do the best with them that we can.

Some years our physics courses are better than they are other years because we have students with a little better background.

If we had more inducements to offer the young people, a little more security, some better bait to entice them into the field, it is possible that there would be more young people asking about X-ray technology earlier in their high school years when we could advise them on the curriculum they should take so they could come to us properly prepared. I don't believe this has had proper emphasis, although it certainly has been mentioned.

Now, as to the junior college program. This could conceivably be a fine educational venture because junior colleges would be eligible for government support and for grants in a way that hospital departments of radiology are not eligible. It would give college credit, an incentive to continued education.

The junior college program would give a broader educational base. Yet there must be close integration and cooperation between the department of radiology, the radiologist in charge, and the college if these programs are going to work well. I would not look for the junior college to be a great panacea.

It would be very interesting to take a close look at some of the existing junior college programs. This is going to be done by the Committee on Technologist Training during this next week or two. Very frankly, the grades that have been established by the junior college graduates and those that have come from the average of all of the AMA-approved hospital programs are so close together you could throw a hat over them. They shouldn't be. The junior college program, if it is good, should return people from their Registry examinations with appreciably higher marks than the other candidates.

Some approved schools are always going to do better jobs than others because they are blessed with more facilities and possibly better and more interested teachers. The general average is pretty good.

I don't want to run anything down, for the junior college record has been good, yet I would hope to see a little more difference between the achievements of applicants from junior college programs and those who have come from the average of general hospital programs.

There is a possibility for sound technological education here, but it is easy to jump to anything new and say that everything we have done in the past is bad, that this is new, this must be good. There is an old truism about not being the first to cast the old aside.

We should look more carefully at this. A few more pilot programs should be established and watched to see how well they do before we turn our backs on something that has given us technology as we know it today. Some developments we had feared have failed to materialize. We came with a certain trepidation in our souls that we haven't found justified. We had been led to believe that a mass production, lowered standard of training project would be promoted to meet the manpower need in the field of technology. We had seen a series of pictures and captions showing high school dropouts reputedly being trained to be X-ray technicians in a simulated X-ray room in a building in Los Angeles. The captions stated that these individuals were sent there on a federal grant, and were being given a 41-week course of training that would graduate them as X-ray technicians.

Frankly, we were afraid that this might be the pattern that would be proposed. I'm sure every technologist came with the worry that things would happen here that would downgrade our training, deteriorating what we have rather than building it up to something better than we now have. The first thing that has pleased technicians is the realization that everyone seems to have similar goals--the elevation of standards and not the degrading of them.

Throughout the conference technologists have been pleasantly surprised. We came with groundless fears about a few other aspects which really haven't come up. No one has downgraded the technician very much. We haven't so far had any wide open promotion for governmental regulation that would segmentalize and change the whole educational pattern in 50 States under the pretense of radiation protection, although I believe I hear the rustling of the wings, and this may evolve later. Should it come, it would be in opposition to the wishes of technologists.

I rather imagine there is less confusion about where technicians stand on this than some may think. They have overwhelmingly turned it down every time it has been proposed and they have had a chance to discuss it and talk on it. But this is not for me to say now, and I am not here to propagandize at all, and I don't mean to do so.

We have been happy to find that no one has promoted all out for unionization, for we choose to consider ourselves a profession. We don't know that we will ever make the money that the bricklayers or electricians do or truck drivers, but we don't want to be bricklayers and electricians and truck drivers. Right now we are in a pretty happy economy, and maybe some of those people will be walking the street later on. Should this happen, I hope the Government doesn't find the money to keep their salaries up as they walk around and live in idleness while we continue to work. One thing we have always had is a certain feeling of security in a hospital. This is not what keeps us in. We stay in, frankly, because we believe in what we are doing, and because we have a great feeling for the patient. If we didn't have this feeling, I don't believe we would have gone into the field in the first place. This is a matter of initial motivation.

The things that we have done so far in technology have been well in line with what we think this conference has been trying to establish. We feel that the probability of getting some help in learning to be better teachers and developing teachers for the future is good.

We might question whether the people who are turned out of a four- or five-year program with a baccalaureate degree are ready to teach or whether they are ready to be top-flight technologists or supervisors because, first, they must learn to operate the equipment and work with patients and people. This takes a little more time than folks are apt to think.

This conference has been educational and valuable for the technicians. I think it has been educational and valuable for the radiologists who have been here. And I think it has been educational and valuable to the Division of Radiological Health in the United States Public Health Service because I believe they are far more aware of the interrelationship that exists between technicians and radiologists--excuse me, technologists and radiologists--and of the way X-ray departments operate than they were before.

I don't believe that anything that is going to degrade the technician, any biting off little chunks here and there and feeding them to someone else--I don't think this is what we are looking for. Everyone is conscious of the big void that does exist, and of this so-called "job ladder" we must have that is going to fill up the void between the technologists and the radiologists. I believe that mutually, individually, organizationally, we probably will consider this with the radiologist to see whether we have some responsibility here, something we can do about it.

I am sure I can think of a few things we can do for the radiologists with their blessing. They will gladly turn over to us the eight o'clock film conferences. They may even want us to take over some of the simpler fluoroscopy. This has been suggested by radiologists.

If there is a way we can serve better than we are, if you can show us where we can serve more importantly than we are serving, we probably have demonstrated to the people in attendance that we want to do so. It is not only a question of dollars in this particular case, but a question of technologists wanting to do their job and to serve radiology better than we have done to date.

I could hardly leave without thanking Dr. Chadwick and everyone else who has made this such an outstanding meeting and for giving us this experience.

I apologize for usurping the stand from Dick Chamberlain because Dick would have had everybody in the aisles by now. But thank you very, very much, everybody. I think the conference has been a wonderful experience. I hope we have more of them. I hope maybe we can all come again.

DR. CHADWICK: Well, all I can say, Clark, is you are so eloquent that I am awfully glad I didn't give you a longer notice because you would have shown all the rest of us up.

Now, we would like to have one final discussant of the conference. That is Dr. Harold Peterson from Minneapolis who, I am sure all of you know, is chairman of the Commission on Technologists Affairs of the College of Radiology. We would like to hear his comments from his vantagepoint.

DR. HAROLD O. PETERSON: This has been, I would say, an intense meeting. We have been busy all the time listening to facts and figures. It is impossible to assimilate all of this, I am sure.

Well, I believe this meeting was called to discuss the alleged shortage of radiologic technologists. My remarks on this will be personal remarks and don't represent the official position of the College of Radiology or the Commission on Technologists Affairs which one couldn't possibly do at a meeting of this type without first convening the college and getting an opinion. So I will just express my own reactions to some of the things that have taken place here.

I hope not to be too repetitious and will leave out, if possible, most of the things that have already been mentioned several times.

I believe I detect throughout the meeting a sort of rivalry or a sense of competition between the two major groups involved here--that is, the old guard of well-established technologists and radiologists and the Public Health Service.

The Public Health Service believes there is a problem and is seeking our advice on how to change this old order. And I believe the old established radiological groups would like the problem better or more clearly defined and changes, if necessary, implemented through already established organizations.

Change may be necessary, but I am reminded of the old saying that change just for the sake of change is not necessarily desirable.

As I understand it, the problem that brought us here--according to Dr. Chadwick's letter--is "What will it take to provide adequate numbers of appropriately qualified operators of X-ray equipment in medicine?"

And I would prefer to limit my reactions concerning the meeting to this topic. What are the numbers required and what is the definition of an appropriately qualified technologist? These are two questions.

Going to the first one, what are the numbers of technologists required? We haven't received an answer so far as I recall from this meeting. I am not sure that I have heard any "guestimates" of how many are required right now nor any projected estimates for the future.

I asked myself, "Is there truly a shortage?" I believe all of us tend to think in terms of our own area and perhaps feel the rest of the world is like our area. And, of course, this isn't right.

But in our particular area, (Minneapolis-St. Paul) if we don't consider at this time specialized therapy technologists and isotope technologists, there is no shortage in the metropolitan districts.

We have a large number of training schools. I think most of them are good schools with adequate numbers of students, and we really don't have a shortage of diagnostic radiologic technologists.

There are some specific places, I am sure, where there probably is a shortage. But taking in the overall picture, I am not sure that this is a crucial problem at this moment in radiologist-supervised departments in the larger centers.

Now, there is evidence that radiologic technology--and this has been amply supported here--which is done by physicians other than radiologists, such as orthopedists, general practitioners, internists, for example, is not by and large done by trained technologists. If we were to try and replace all of the people who operate these installations with trained technologists, there would then be a colossal shortage of trained radiologic technologists.

But we have been told that they are doing a comparatively small percentage of the total amount of radiologic work being done. And I would guess that this is a steadily diminishing amount of work.

From a purely practical standpoint, they can't possibly be replaced by qualified technologists at this time. I will come back to that a little bit later.

As I said earlier, I don't believe there is a real shortage of technologists in many metropolitan areas. Most of the medium sized communities, especially in our area--New York State apparently being somewhat different from the rest of the country in this regard--the smaller communities of, say, 10,000 people, 15,000 people, are getting radiologists. And this in turn is upgrading technology in these communities because the radiologists wish to have trained technologists. Thus these smaller communities are also being supplied with trained technologists working under supervision of a radiologist.

The real problem, and this has been emphasized by Dr. Chadwick and others, is the attrition in the numbers of trained technologists who continue to work and not in the total number of technologists being trained.

If we are producing 6,000 technologists a year as stated earlier, this is a very large number. The attrition rate, however, is high, and it is based, as you have heard over and over again, on the fact that 73 percent, or something close to this figure, are females. As has been said, females work about two years after their training.

Well, I don't think the solution is to train larger and larger numbers of females to get such a small increment of the more permanent type of radiologic technologists that we are after. The only other answer, as I see it, is to try and train more males. And this also has been discussed over and over. And

I don't need to repeat the things that are necessary to attract males into the field. But I don't really see any other answer. I don't believe we are going to change the social life of the United States so that females all of a sudden are not going to be females and will remain in large numbers for many years as technologists as males would do if adequately paid.

If we can get males into radiologic technology, then we will plug this leak or this attrition rate.

The problem of getting qualified technologists into the smaller communities, smaller than 10,000 or even under 5,000 or 2,000, into the small hospitals of 50 beds and so forth, I believe, a sociological problem, not peculiar to R.T.'s. Professionals tend to prefer to live in the larger communities and don't wish to go to the smaller communities except for the occasional individual. And I don't know any way of correcting this other than to develop such a surplus of R.T.'s that the metropolitan areas are all filled up and they really must move into rural areas to look for jobs. And just like doctors, they will usually go to the smaller communities when there is no place else to go.

I don't think higher salaries will attract people with this training to the smaller communities. A few will go, but most won't.

Now, to touch on the other problem concerning what is an appropriately qualified technologist.

I think there are two types of qualifications as far as an expert radiologic technologist is concerned.

In the first place, the diagnostic technologist should be able to produce a satisfactory radiograph and at the same time cut down on unnecessary radiation to the patient.

When one says "satisfactory radiographs," the problem then comes up: What is a satisfactory radiograph? And I suspect that except for a very few criteria, there aren't very many radiologists who will all agree on the same type of examination. Everyone will agree that most films probably shouldn't have any motion of the part being studied. After that, there is a wide range of disagreement. Some people like films over-exposed, some under-exposed, some that might be considered correct exposure, some one position, some another position. It all depends on the individual radiologist that the technologist is working with and there is no one national standard of what is an acceptable radiograph.

So there is a wide range of choice here but there is no similar range of latitude on cutting down on unnecessary radiation. This can be quite specifically spelled out and the Public Health Service is playing a role in this regard. And radiologic technologists who are well trained also know about these dangers. And I think this is no longer a problem in the hands of those who are trained as they are now being trained in the approved schools of radiologic technology. I would just like to make a few remarks on the second aspect of what is an ideal technician; that is, the radiologist's dream of an ideal technician.

He or she is one who handles patients superbly, obtains perfect radiographs, handles physicians, including the radiologist, superbly, works well with their associates, is neat and professional in appearance, rarely absent, and is interested in the welfare of the entire department. One could go on and list other similar things, but these are some of the very desirable qualities. And I am afraid they aren't things that we can exactly build into people. It is hard to develop these qualities if they are missing in a person who might otherwise be an ideal technician. People are born and raised in this fashion, and I believe it is our job to try and attract this type of person into radiologic technology.

I have no idea how to do it. But these are the types we would like to attract into the profession rather than the low IQ or otherwise substandard person.

My recommendations at this point would be that we continue to support the two-year hospital-based program. I think this should be and will be the major source of technologists for the immediate foreseeable future. And it is safe to say and, I believe, that even though we stick to our present minimum standards of training, and I think most technologists will agree, as well as most radiologists, that with these minimum standards, we don't often end up with the dream technician. I think we can come up with the safe technician from the standpoint of the radiologic hazards, but not the perfect dream technician that we would all like to have. This, I believe, is going to require recruiting of a type we don't know how to do right now.

Second, the junior college programs should be developed, attempting to maintain an adequate amount of practical in-hospital training in an approved hospital department, but I wouldn't expect to see any significant improvement in the quality of technology that will come from a two-year college hospital program.

I think we should certainly cooperate with the community colleges in this field and explore it so as to bring out its best features.

One point in teaching that has not been mentioned and probably would be most likely very unpopular is a consideration of methods of improving the quality of work that is being done now by nontrained technologists in situations where it seems essential that this type of work has to be done. There are plenty of places in Minnesota and elsewhere, and I suspect there are plenty of places in New York, that even though they have licensing which theoretically has eliminated unqualified technologists, these people are still making radiographs. It is better to try and improve them than to neglect them or ignore them. You can't just say they aren't there.

I think this is a diminishing group as the years go by. But in Minnesota, for example, in a small town, there is a general practitioner. I think he should have an X-ray machine. He is 30-50 miles from a larger center, and he has a patient with a fracture. What is he supposed to do? He can't get a qualified technologist. He must have an X-ray machine. He must take a radiograph.

We should set up some kind of a training system perhaps related to bigger hospitals, bigger institutions, where these people can come in once a week or once a month or weekends or sometime and learn some of the basic principles of radiologic technology to do what he has to do in a safe manner.

I am sure some people will rise up and say, "This is terrible. You should eliminate all of these units."

But if you think about it a little bit, you can't close them up at this time. They are there serving a necessary purpose taking films. We should try and do something to help them out.

I think this type of radiographer will gradually disappear. I don't think licensing is going to eliminate these individuals until we have enough accredited people to fill all these spots. And we can't do it now even if we had a police state in this country. There just aren't that many people centered around major institutions that would be helpful in our area if it were well known that technicians in the area were welcome in our institution for a week or a day or a month or on a regular basis to come in and see what is going on and help them to upgrade whatever they are doing. This would be, thus, a continuing ongoing improvement program. It might well be a practical adjunct to national or regional seminars of a few days' duration.

We did talk a little about the possibility of assistance from Government in a financial way, without any strings attached in our inspection and evaluation of hospital technology programs. This is getting to be quite a job. We have done it for many years without any outside financial assistance, and there are about a thousand approved departments now, which are reapproved ever so often, in addition to all the new ones seeking initial approval. This becomes a very large task. Dr. Brad Soule has really done most of the organizing and much of the leg work by himself. There won't always be a Brad Soule. We might well consider a more official office of some kind that will take over this big job. And it might need some financial support some day.

Well, I believe it is quite evident that Dr. Chadwick and Mr. Dahl and their groups are very sincere, intelligent, capable representatives of the Public Health Service.

In closing, I would just like to again express a word of appreciation to the Center of Adult Education. We have a similar place at Minnesota. It is very old and very poor compared to this rather new and excellent institution.

I do wish to express my sincere thanks to Dr. Chadwick and Arve Dahl and the rest of their group for organizing this meeting. I suspect we need some more meetings, perhaps not such large meetings. But as in our place, we always ask the registrants who come to our courses if they would like to have the meetings limited to smaller groups. And nobody really wants them limited because they all want to come. Perhaps we will have to continue to have large meetings and perhaps some small meetings and try to solve the problems which we all face.

Thank you very much.

CLOSING OF THE CONFERENCE

DR. CHADWICK: Thank you very much, Dr. Peterson. You are a tough man to follow. I am glad that I don't have a talk to give, but just have the task of closing this session.

The time has moved along--it is close to 3:00 o'clock. I had thought that we might have time for discussion, but my guess is we are probably fairly well "discussed out" by this time.

In closing this conference, I certainly want to express my gratitude to the people who have come. As I said earlier, our scheduling was very close because of the commitments of the Center here and our own activities. We gave you very short notice for this conference. And I certainly appreciate the really splendid participation.

I would also like to give special thanks to the speakers and moderators and assistant moderators for the fine work they have done. They have made the task we have ahead of us now--namely, pulling this together in the form of a proceedings--a very simple task indeed, because it was handled as skillfully as it was.

I also want to express appreciation to Dr. Bradley Soule who has been our overall consultant on this conference. Thank you very, very much, Brad. We honored your request not to put you on the program, but you have been a valuable source of help to us in planning the conference and assuring the degree of success that I feel we have achieved.

I would also like to express our appreciation to Mr. Mauch. I don't see him around, but he has been ever present and extremely helpful.

I was interested to hear the comments of Dr. Peterson. It has been my impression that things went very smoothly. Mr. Mauch has been present at all sessions, even those in the evening. The arrangements he has made have been very helpful.

And finally I would hope that I will be excused if I recognize the people in the Public Health Service, Mr. Dahl and the rest of the people in the Training Branch of our Division, who did all the planning. I really had virtually nothing to do with it. I want to thank them publicly here for the splendid arrangements that they have made for the session. It has made my task very, very simple.

Well, with this, I want to indicate that we will move as rapidly as we can to prepare the proceedings. This has come up several times before. But for those of you who may not have been in the meeting when it was mentioned, we will be putting out the proceedings.

We will have the transcript from all of the general sessions. And we will have the moderators' reports from the work sessions. We will get these together as quickly as possible and make them available to you in appropriate quantities, I hope.

So with that, we will adjourn.

As you leave, you will be given a packet. Among other things, it contains a small questionnaire. If there is some burning comment you just never quite got the opportunity to make during the session, we would like you to feel free to put it on the questionnaire and send it back to us.

We can use it in the preparation of the final proceedings. The final roster of all of the people who registered for the meeting is also in the envelope.

With that, let me wish you a pleasant trip home and thank you again for coming.

(At 3:00 o'clock p.m., the meeting adjourned.)

University of Maryland
Center of Adult Education

National Conference On X-Ray Technician Training
September 7-9, 1966

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